



- ▶ The word cell comes from the Latin word "cella", meaning "small room", and
- ▶ The word cell was first coined by a microscopist observing the structure of cork.
- ▶ Cells are often referred to as "the building blocks of life".
- ▶ A typical human body contains about a trillion cells.
- ▶ What makes the green color of plants? Chlorophyll
- ▶ A piece of metal plate with a circular hole is heated. If the metal plate expands on heating, the diameter of the hole will increase
- ▶ Which metal is extracted from sea water? Magnesium
- ▶ The freezer in a refrigerator is fitted near the top it facilitates convection currents
- ▶ The swing of a spinning cricket ball in air can be explained on the basis of Turbulence caused by wind
- ▶ Which one among the following methods is not effective in removing arsenic from contaminated ground water? Boiling
- ▶ Silver ware turns black after a period of time due to formation of Sulphide coating on Silver
- ▶ A student by chance mixed acetone with alcohol. This mixture of acetone and alcohol can be separated by fractional distillation
- ▶ Iron nails are dipped into blue copper sulphate solution. After some time iron nails are not dissolved but blue is discharged
- ▶ Glass is actually a vitrified liquid
- ▶ Which one among the following is the main ingredient in cement? Gypsum
- ▶ When a ray of light is going from one medium to another, its frequency remains same
- ▶ Magnets attract magnetic substances such as iron, nickel, cobalt etc. They can also repel diamagnetic substances
- ▶ A liquid rises to a certain length in a capillary tube. The tube is inclined to an angle of  $45^\circ$ . The length of the liquid column will increase
- ▶ Which one among the following is not a source of renewable energy? Fuel cell
- ▶ What is the outermost boundary of plants? Cell wall
- ▶ The conversion of gases into liquid under high pressure and low temperature is called regulation.
- ▶ If a green leaf is seen in a red light its color will be black.
- ▶ Skin does not excrete oil.
- ▶ Plants growing in extremely dry condition are called Xerophytes.
- ▶ Roots absorb water from soil which is Hygroscopic.
- ▶ Legumes increase the fertility of the soil by adding nitrogen to the soil.
- ▶ New varieties of organisms can be brought about by hybridization.
- ▶ Fertilization is fusion of two gametes of different strains.
- ▶ Fruit developed from single ovary is called simple fruit.
- ▶ Seeds are developed from Ovule.
- ▶ Grains swell in water due to imbibitions.



- ▶ Chlorophyll contains magnesium.
- ▶ The rate of transpiration depends upon frequency of Stomata.
- ▶ Light is necessary for photosynthesis because it produce ATP and reducing substance.
- ▶ Oxygen liberated from photosynthesis comes from water.
- ▶ Red light is most suitable for photosynthesis.
- ▶ Respiration means food oxidation and evolution of energy.
- ▶ The organisms which are the only living membrane of their group and link two major groups are called Living Fossil.
- ▶ Mammals cannot be cold blooded.
- ▶ Trypanosome a parasite causing sleeping sickness.
- ▶ Half-time is a time of radioactive substance taken by that substance to decompose radioactivity to half of its weight.
- ▶ Structure of DNA was given by Watson and Crick.
- ▶ In Nuclear DNA is concentrated in chromatin.
- ▶ Cellulose respiration is done by Mitochondrion.
- ▶ Light energy is stored in the form of chemical energy due to the activity of Chloroplast.
- ▶ Protoplasm is a colloidal solution.
- ▶ In cryptograms, the sex organs are primitive and hidden.
- ▶ Angiosperm includes the plants which have covered flowers and covered seed.
- ▶ Plant cells resembles animal cell because having a cell membrane made up of protoplasm.
- ▶ Snake have been evolved from lizard.
- ▶ Plants in which seed are outside the fruit are called Gymnosperms.
- ▶ 0.200 grams are equal to one carat.
- ▶ Which of the following glands are known as exocrine glands? Salivary glands and sweat glands
- ▶ Where is the hormone prolactin produced? Pituitary gland
- ▶ What is the incubation period for mumps? 12 to 25 days
- ▶ The polio virus enters the body through Contaminated food and water
- ▶ The persons whose blood has a reduced capacity of delivering oxygen to tissues suffer from Hemophilia
- ▶ Which one of the following is heredity disease? Hemophilia
- ▶ H<sub>5</sub>N<sub>1</sub> virus causing global pandemic influenza is Bird flu
- ▶ Convex lenses are used for the correction of Long sightedness
- ▶ Short sightedness can be corrected by Concave lens
- ▶ Insulin, a drug that checks diabetes, was discovered by Dr. Banting
- ▶ B.C.G. vaccine is used against T.B
- ▶ Which of the following cancers is curable without surgery? lymphoma
- ▶ Most common skin cancer? Basal cell carcinoma
- ▶ In what organ of the human body do pheochromocytomas occur? Adrenal Gland
- ▶ According to *Cell Theory*, first proposed by Schleiden and Schwann in 1839, all life consists of cells.
- ▶ Rhodophytes are typically found in warmer seawater, and are more delicate and smaller than brown algae (phaeophytes).
- ▶ Which metal is a constituent of Vitamin B12? Cobalt
- ▶ Which is a vestigial organ of man? Appendix, Coccyx & Nictitating membrane



- ▶ Pituitary gland is called Master Gland
  - ▶ Fat is digested in the small intestine
  - ▶ The largest cell in the human body is nerve cell
  - ▶ Heat from the sun is received by the earth through radiation
  - ▶ Dengue fever & Ebola is a Viral Disease
  - ▶ Hand, foot and mouth disease is a Viral Disease
  - ▶ Viruses are extremely small organisms which only grow in living-cells.
  - ▶ The blue colour of the water in the sea is due to scattering of blue light by water molecules
  - ▶ A pond of clear water appears less deep than it really is. This is due to refraction
  - ▶ Leaves look green, because absorb all Colours reflect Green
  - ▶ Those diseases which are caused by the attack of an organism outside the body conveyed into human body in different ways are called 'infectious diseases.
  - ▶ Gerontology is the study of process of ageing
  - ▶ What name is given to the stiffening of the body after death? Rigor mortis
  - ▶ The Average weight of man's brain is 4.8 ounces.
  - ▶ Penicillin was discovered by Alexander Fleming
  - ▶ Copper is used in making brass, bronze and German silver.
  - ▶ Composition of bronze is Copper and Tin
  - ▶ An instrument used for measuring atmospheric pressure is called Barometer
  - ▶ Chlorofluorocarbons cause decomposition of ozone
  - ▶ Curd Making is an ancient 'Bio-Technological' process involving Bacteria
  - ▶ Carrier of parasite Plasmodium is Mosquito
  - ▶ Which organ excretes water, fat and various catabolic wastes? Kidney
  - ▶ The Cause of loss of forest cover is Increasing Population
  - ▶ The function of hemoglobin in the body is Transport of oxygen
  - ▶ Which crop helps in nitrogen fixation? Beans
  - ▶ Which ecosystems covers the largest area of the earth's surface? Marine Ecosystem
  - ▶ Fruit most suitable for making jelly is Mango
  - ▶ Ground Nut is the richest source of protein
  - ▶ Cotton is a cellulose fiber?
  - ▶ Nuclear membrane is absent in Prokaryotes
  - ▶ The which organ does a fish respire? Gills
  - ▶ Which gas is the second most abundant element in the universe, and has the lowest melting point of any element? Helium
  - ▶ Care must be taken when handling this radioactive gas. Long term exposure to even minute quantities, can cause lung cancer? Radon
  - ▶ In nature, this gas is only ever found combined with other elements. In its pure state however, it is fatal if inhaled? Chlorine
  - ▶ ATP is called 'universal biological energy currency'
  - ▶ Leukaemia is caused by the over production of white blood cells
  - ▶ Which is concerned with the synthesis of protein? Ribosomes
  - ▶ If Pancreas stops functioning in the body then the level of Insulin and



- ▶ glucagon will decrease
- ▶ Which glands secrete tears? Lachrymal glands
- ▶ The average human voice is around 250 Hz
- ▶ Which of the following is responsible for Coagulation of blood? Fibrinogen
- ▶ Red Ants are also known as Formica
- ▶ Pineal gland secretes Melatonin & Serotonin
- ▶ Lysosomes act as suicidal bags.
- ▶ Which mineral helps in clotting of blood and conduction of nerve impulse? Calcium
- ▶ What is commonly known as 'biological clock'? Pineal gland
- ▶ Energy is stored in Mitochondrion as ATP molecules.
- ▶ Which one of the following is 'Power house of the cell'? Mitochondrion
- ▶ Which secretes ADH to control water balance in the body? Hypothalamus
- ▶ Which gland is responsible for growth and metamorphosis? Thyroid
- ▶ Dengue fever is spread by Aedes aegypti mosquito
- ▶ Hemophilia is known as the failure of Blood to clot
- ▶ Which two organs/glands are affected by malaria? Spleen & Liver
- ▶ Red stripe of sugarcane is a bacterial disease
- ▶ Sickle cell anemia is a red blood cell disorder
- ▶ A deficiency of which mineral can cause stretch marks in our skin? Zinc
- ▶ What part of the lungs are mainly affected by pneumonia? Alveoli
- ▶ In which organ of the human body are the lymphocyte cells formed? Spleen
- ▶ The spleen is the largest mass of lymphatic tissue in the body measuring about 12cm in length
- ▶ Antigen, a foreign substance usually protein in nature, elicits the formation of specific antibodies within an organisms
- ▶ Cells were first discovered by Robert Hooke in 1665 and observed the cells in a cork slice with the help of primitive microscope
- ▶ Endoplasmic Reticulum consist of ribosome are responsible for protein synthesis
- ▶ Thyroid gland is popularly known as Adam's Apple
- ▶ The one which is present in all living things? DNA or RNA
- ▶ The mechanism of stomatal movement is related to the branch of Biology called Physiology
- ▶ Maximum number of species of living things on earth is related to insects
- ▶ Adrenal glands are situated Over the kidneys
- ▶ Which gland controls Blood pressure? Adrenal
- ▶ Which hormone is known as 'emergency hormone'? Adrenaline
- ▶ Pancreas secretes both an enzyme and a hormone
- ▶ Variety among amino acids is produced due to R group
- ▶ Where is Thyroid gland situated? Below the Larynx
- ▶ Which is the largest gland in the body? Liver
- ▶ The hardest material found in human body is Enamel
- ▶ Primary structure of proteins determines amino acid sequence
- ▶ Myosin is not a globular protein
- ▶ An enzyme which converts a dipeptide into separate amino acids is an example of hydrolase
- ▶ Cellular digestion is associated with



which organelle? Lysosomes

- ▶ The unicellular organisms ingest large molecules into their cytoplasm from the external environment without previously digesting them. This process is called Phagocytosis
- ▶ A virion is? Virus
- ▶ An isolated virus is not considered living since it? Cannot metabolize
- ▶ Bacteriophage that infect E. coli are called? T type
- ▶ Attachment of the bacteriophage with the receptor site on the bacterial cell wall involves? Weak chemical union between them
- ▶ In life cycle of bacteriophage which step occur after attachment of prophage with the receptor site of the bacterial cell wall? Penetration
- ▶ In lysogenic cycle the process of separation of phage DNA from the host's chromosome and initiation of lytic cycle is called? Induction
- ▶ In the lytic cycle of bacteriophage the host DNA is? Digested into its nucleotides
- ▶ In the Lysogenic cycle the DNA of the bacteriophage? Joins the bacterial chromosomes
- ▶ Temperate phage may exist as? Prophage
- ▶ Tobacco mosaic virus is? Rod Shaped
- ▶ Which of the following is an RNA virus? Influenza virus
- ▶ Which of the following disease results in Paralysis due to viral attack on C.N.S? Polio
- ▶ An enzyme which can convert single stranded RNA into double stranded viral DNA is called? Reverse Transcriptase
- ▶ Which is the smallest known virus? Polio virus
- ▶ Complex symptoms like severe pneumonia vascular tumor sudden weight loss swollen lymph nodes and immune deficiency are features of? AIDS
- ▶ AIDS is a host specific disease
- ▶ AIDS can be prevented
- ▶ Mode of transmission of hepatitis A is? Faeco-oral
- ▶ Which one of the following specially result in chronic liver disease leading to hepatic failure? HCV
- ▶ For which of the following no preventive vaccine is available? HCV
- ▶ The word Archaeobacteria (a division of bacteria) derived from Greek means? Ancient bacteria
- ▶ Who coined the term Animalcules for microorganisms like Bacteria and protozoa? Leeuwenhoek
- ▶ Who discovered the bacteria causing tuberculosis and also developed various techniques of media preparation and maintenance of pure culture? Robert Koch
- ▶ Germ theory of diseases of Robert Koch? 1. A specific organism can always be found in association with a given disease 2. The organism can be isolated and grown in pure culture in the laboratories 3. It is possible to recover the organism in pure culture from the experimentally infected animals.
- ▶ Which of the following structure is not present in all the bacteria? Capsule
- ▶ Which types of clothes is manufactured by using petroleum products? Nylon
- ▶ Polythene is industrially prepared by the polymerization of Ethylene
- ▶ Hydrogen is used instead of Helium to fill balloons for meteorology because of its low density
- ▶ Which gas is used in cigarette lighters? Butane
- ▶ Anesthesiologists study and administer anesthesia and anesthetic medicines that help in facilitating treatment, diagnosis of medical conditions and



complete minor and major surgeries without the patient having to feel more than the prick of the anesthetic needle

- ▶ Doctors of the heart that diagnose and treat heart diseases and cardiovascular diseases are called Cardiologist
- ▶ Dentist doctors are concerned with dental health, teeth and dental problems like cavities and bleeding gums. They treat gum diseases, straighten teeth, carry out root canals, etc
- ▶ A dermatologist studies the skin, its structure, functions, and diseases, as well as its appendages (nails, hair, sweat glands) and treats the related ailments are called
- ▶ A doctor who studies disorders of the endocrine system and their glands, like thyroid problems and other such hormonal imbalances and the specific secretions of hormones is what entails an endocrinologist job description is called Endocrinologists
- ▶ Epidemiologists are the doctors who are also known as 'disease detectives'. They carry out study of diseases and come up with ways of prevention of diseases through vaccinations, etc
- ▶ A doctor that studies diseases of digestive system and gives treatment related to the gastroenterology is? Gastroenterologist
- ▶ The doctor who studies and treats diseases of the female reproductive system is called Gynecologists
- ▶ A hematologist studies blood and its diseases
- ▶ Doctors who study all aspects of the immune system in all organisms and gives treatment to diseases of the immune system are called Immunologists
- ▶ Doctors who focus on adult medicine and have completed a special study related to the prevention and treatment of adult diseases are called Internists
- ▶ A medical geneticist is the doctor that

carries out studies, tests, treatments and counseling patients with genetic diseases

- ▶ A microbiologist studies causes, diagnosis and treatment of infectious diseases
- ▶ The neonatologist is the doctor that provides medical care to premature and critically ill newborn babies
- ▶ The doctor who treats kidney diseases and problems is called Nephrologist
- ▶ Doctors who treat one of the most delicate and important organs of the body, the brain are called Neurologist
- ▶ Neurologist doctor treats in conditions like seizures, strokes, Parkinson's, Alzheimer's, etc
- ▶ Neurosurgeons are surgeons who treat central and peripheral nervous system diseases that can be cured or controlled to some extent with mechanical intervention
- ▶ An oncologist job description entails treating cancer patients
- ▶ The doctor that takes care of eyes and treats various eye problems and performs different eye surgeries is called Ophthalmologist
- ▶ The doctor who is concerned with the skeletal system of the human body, that is, bones. These doctors make no bones about broken, fractured or arthritis struck bones is called Orthopedic Surgeon
- ▶ An ENT specialist treats the Ear, the Nose and the Throat, as well as to some extent some ailments of the head and the neck. This field is also known as otolaryngology
- ▶ The doctor who is an expert in caring and treating high risk pregnancies is called Perinatologist
- ▶ Doctors are into the study of ancient diseases are called Paleopathologist
- ▶ The study of parasites, their biology and pathology, as well as the parasitic



- ▶ diseases caused by them is carried out by a parasitologist
- ▶ Pathologist is a doctor who studies of abnormalities in living organisms, diagnosing diseases and conditions from tissue samples like blood or biopsy samples.
- ▶ Pathologists also work as medical examiners & carry out autopsies to determine the cause of death.
- ▶ A pediatrician is the doctor who studies and treats medical problems of infants, children, and adolescents.
- ▶ A physiologist is a life science doctor who specializes in physiology.
- ▶ Physiatrist is a doctor whose specialty is medicine and rehabilitation.
- ▶ A plastic surgeon is the doctor who can literally change the life and look of a patient. He performs cosmetic surgery to repair skin and structural problems that may alter the personality of the patient for good.
- ▶ The doctor who studies and treats disorders of the foot and ankle is called Podiatrist
- ▶ Pulmonologist is a doctor who diagnoses and treats lung conditions and treatments and even manages critical care patients admitted in the ICU and those that are on ventilator support.
- ▶ The study of medical use of X-rays or other imaging technologies for diagnoses and treatment of disease is carried out by an radiologist.
- ▶ Doctors who treat allergic conditions & autoimmune disorders are called Rheumatologists
- ▶ The urologist is a doctor who studies the urinary system and treats urinary tract infections.
- ▶ Taxonomy is the science of classification of animals and plants
- ▶ Thermodynamics is the physics of energy, heat, work, entropy and the spontaneity of processes
- ▶ Zoology is the study of animals
- ▶ Paleontology is the science of the forms of life that existed in geologic or prehistoric periods.
- ▶ The life sciences (also known as) Biology is the study of the development, distribution, evolution, function, origin, and structure, of living things.
- ▶ Taxonomy is the study of classification of organisms
- ▶ If a green leaf is seen in a red light its color will be black.
- ▶ Which Vitamin is now recognized as a steroid like hormone, but not originates from an endocrine gland? Vitamin D
- ▶ Extremely high doses of which vitamin could damage the kidney and causes of kidney stone? Vitamin C
- ▶ Deficiency of Vitamin A causes xerophthalmia
- ▶ Which vitamin is also known as "Retinol"? Vitamin A
- ▶ Which vitamin is also known as Naphthoquinone? Vitamin K
- ▶ What is the chemical name of vitamin B-2? Riboflavin
- ▶ Which vitamin cannot store in human body? Vitamin C
- ▶ Citrus fruits are one of the best sources of Vitamin C
- ▶ Which vitamin is called "anti-scorbutics" vitamin? Vitamin C
- ▶ Which vitamin is also known as "Ascorbic Acid"? Vitamin C
- ▶ Which vitamin is essential for the formation of collagen? Vitamin C
- ▶ What is the chemical name of vitamin B-5? Pantothenic acid
- ▶ What is the chemical name of vitamin B-1? Thiamine
- ▶ Vitamin B-7 is also known as Biotin
- ▶ Deficiency during pregnancy is associated with birth defects, such as



neural tube defects? Vitamin B9

- ▶ Which Vitamin deficiency results in spontaneous bleeding? Vitamin K
- ▶ Fortifies White Blood Cells; helps the body's resistance to stress; are produced by Vitamin B-5
- ▶ Which vitamin assists in formation of antibodies and red blood cells Vitamin B-2
- ▶ Avitaminosis is a disease caused by chronic or long-term deficiency of Vitamin
- ▶ Vitamins were first called accessory factors because in 1906 it was found by English biochemist Sir F. G. Hopkins
- ▶ The word "vitamin" came from the term vita mines, which was introduced in 1912 by Casimir Funk
- ▶ Rickets disease occurs due to the deficiency of Vitamin D
- ▶ Which vitamin is now recognized as a steroid like hormone? Vitamin D
- ▶ Which vitamin plays role in calcium conservation by the kidney and in bone mineralization, but its most important function is to enhance calcium transport across intestinal cells? Vitamin D
- ▶ Which vitamin is produced after exposure of skin lipids to ultraviolet light? Vitamin D
- ▶ Which vitamin is also known by the names of Tocopherol and Tocotrienol? Vitamin E
- ▶ Vitamin B-9 is also known as Folic acid
- ▶ Which vitamin enhances iron absorption in human body? Vitamin C
- ▶ Overdoses of vitamin C can cause nausea, diarrhea, stomach cramps, skin rashes, and excessive urination.
- ▶ Vitamin K was discovered in Copenhagen in 1929 by Henrik Dam
- ▶ Beri-Beri is caused by the lack of vitamin B1
- ▶ The vitamin useful in alcoholism is

Thiamine

- ▶ Mango contains vitamins A and C
- ▶ Convulsions in infants is caused due to the deficiency of Vitamin D
- ▶ Which is a water soluble vitamin? Vitamin C & Vitamin B
- ▶ Which vitamin helps in the absorption of calcium? Vitamin D
- ▶ Which vitamin most common in fish liver oils, milk, and egg yolk? Vitamin D
- ▶ Who gave the Laws of Gravitation? Newton
- ▶ In old age, people generally have to wear spectacles for reading and writing because they lose the power of accommodation
- ▶ Calciferol is the chemical name of which vitamin? D
- ▶ Which vitamin can be produced by the body? D
- ▶ Which vitamin is present in large amounts in citrus fruits like lemons and oranges? Vitamin C
- ▶ Which vitamin is required for formation and maturation of RBCs? Vitamin B-12
- ▶ Which vitamin is now recognized as a steroid like hormone? Vitamin D
- ▶ What disease is caused by a deficiency of Niacin (Vitamin 3) in the diet? Pellagra
- ▶ Which Vitamin deficiency leads to Pernicious anemia? Vitamin B-2
- ▶ Deficiency of vitamin E causes Sterility
- ▶ Vitamin C is also called Skin food
- ▶ Vitamin B1 is available is yeast.
- ▶ Scurvy, arising due to deficiency of vitamin C, it is related to Gastro-intestinal disorder.
- ▶ Sodium is necessary of nervous system.
- ▶ Vitamin D is essential for calcium metabolism



- ▶ Vitamin E is necessary for iron utilization; normal reproductive function. Vitamin E is for reproduction.
- ▶ Vitamin A is found in Dairy products
- ▶ Milk contains 80% water. Milk is a complete food. Cheese contains vitamin D.
- ▶ What red-blooded body organ are vitamins A, B, D, E, and K stored in? The Liver
- ▶ A guava contains more vitamin C than an orange
- ▶ Cod liver oil contains Vitamin D
- ▶ Vitamin E is called anti-aging agent
- ▶ Vitamin E helps in fertility process
- ▶ Vitamin B helps maintain normal appetite and good digestion
- ▶ Vitamin E promotes oxygenation and acts as anti aging
- ▶ Water soluble vitamin are B and C and all other are fat soluble
- ▶ Vitamin A is stored as Ester in liver
- ▶ Vitamin A is found in carotene bearing plants
- ▶ Vitamin B<sub>1</sub> complex is the mixture of about twelve components.
- ▶ Vitamin E is found in cereals, green vegetables, egg, etc. Deficiency of this vitamin causes sterility.
- ▶ Vitamin K is mainly confined to green vegetables.
- ▶ Compound eyes help cockroaches to see the objects all around them.
- ▶ Mercury causes biomagnification problem in the Ecosystem.
- ▶ This digestive juice has no enzymes. What is it called? Bile juice
- ▶ Termination of a foetus is called as Abortion
- ▶ In case of thyroid malfunctioning, the levels of which hormone get effected? TSH
- ▶ Which gland is effected by hypothyroid? Thyroid
- ▶ The leaves of a tree or plant are green due to the presence of? Chlorophyll
- ▶ Seed will not germinate if there is no water
- ▶ Which animal never drinks water in its entire life? Kangaroo rat
- ▶ What is the physical phase of life called? Protoplasm
- ▶ The largest cell is egg of an Ostrich
- ▶ Which is the largest human cell? Ovum
- ▶ Nerve Cell is the longest cell.
- ▶ What is the name of the cells in the body that engulf foreign particles like bacteria? Phagocytes
- ▶ What is the life span of RBC? 120 days
- ▶ What is the life span of WBC? 2-15 days
- ▶ Which is the vertebrate that has two chambered heart? Fish
- ▶ The number of ribs in a human body is 24
- ▶ Kiwi is the smallest flightless bird?
- ▶ Saurology is the study of Lizards
- ▶ Hormones are produced by Endocrine glands
- ▶ What is the full form of ADH? Anti Diuretic Hormone
- ▶ What is the normal value of blood sugar in the body? 80 to 120mg/100 ml of blood
- ▶ Which is the largest blood vessel in the body? Aorta
- ▶ Which of the following carries impure blood? Pulmonary artery
- ▶ Who had performed the world's first heart transplant? Christian Bernard
- ▶ What is the name of that process in which oxygen is removed? Reduction
- ▶ Ammonia is an alkaline among the following?



- ▶ Which acid is used in the body to help digestion? Hydrochloric Acid
- ▶ What is a young horse called? Foal
- ▶ Foal is a horse of either sex less than one year of age.
- ▶ Who coined the word Dinosaur for 'terrible lizard'? Richard Owen
- ▶ Sir Richard Owen was an English biologist, comparative anatomist and paleontologist.
- ▶ What term is used to describe the cultivation of plants without soil? Hydroponics
- ▶ The prizes in Physics, Chemistry, Physiology or Medicine, Literature, and Peace were first awarded in 1901.
- ▶ When is World Forestry Day celebrated? March 21
- ▶ Calcium Carbonate is not a fertilizer product
- ▶ In 1994, the UN General Assembly proclaimed 16 September the International Day for the Preservation of the Ozone Layer.
- ▶ Who discovered antiseptic surgery? Joseph Lister
- ▶ Lister introduced carbolic acid to sterilize surgical instruments and to clean wounds, which led to a reduction in post-operative infections and made surgery safer for patients.
- ▶ Which one of the following prevents bleeding? Platelets
- ▶ Platelets have no nucleus. They are fragments of cytoplasm which are derived from the megakaryocytic of the bone marrow, and then enter the circulation.
- ▶ Sphygmomanometer is used to measure blood pressure
- ▶ When is the World Diabetes Day observed? November 14
- ▶ Milk has higher boiling point than water\*
- ▶ Boiling point of water is 100 C
- ▶ Boiling point of milk is 100.45 C
- ▶ Milk is a mix of butter fat and water so it is slightly heavier than water.
- ▶ Green vegetables are a good source of Minerals and Vitamins.
- ▶ Which vitamin is essential for proper bones formation? Vitamin D
- ▶ Global warming is due to increased production of all the following, except Carbon dioxide
- ▶ Atomic number is equal to Number of protons
- ▶ Photosynthesis is a process of Reductive, endergonic and anabolic
- ▶ Phloem is a tissue found in Plants
- ▶ Phenomenon which converts light energy into chemical energy is Photosynthesis
- ▶ Which of the following is used as a memory device in computers? Flip Flop
- ▶ Influenza is a Viral Disease
- ▶ The correct medical term for this disease is varicella. What is its common name? Chickenpox
- ▶ Which of these is the only disease not known to be caused by smoking? Alzheimer'
- ▶ Meningitis is a disease which affects the Brain
- ▶ In which animal is Cushing's disease most common? Dogs
- ▶ Which of the following is not associated with Wilson's disease? Pancreatitis
- ▶ Which of the following is not associated with Reye's syndrome? Hyperglycemia
- ▶ Epidemiology is the study of epidemic diseases
- ▶ A branch of medicine dealing with eyes and related diseases is called Ophthalmology
- ▶ Niacin was first synthesized in 1867
- ▶ The ratio of the velocity of the body to the velocity of the sound is called Mach



number

- ▶ Aluminum is the most abundant metal element in the Earth's crust. Bauxite is the main source of aluminum.
- ▶ Father of Biology is Aristotle
- ▶ Father of Genetics is G.J. Mendel
- ▶ Kingdom protista includes \_\_\_\_\_ phyla? 27
- ▶ Stentor is a/an Ciliate
- ▶ Complex specialized flagellates living symbiotically in the gut of termites are trichonymphs
- ▶ The definite shape to ciliates is given by Pellicle
- ▶ Chalk is gradually formed of dead? Foraminiferans
- ▶ Of the following which one has glassy shells? Radiolarians
- ▶ Classification of algae is based on pigment composition.
- ▶ Most algae have different morphological forms in-different stages of their life cycle
- ▶ Almost all algae are aquatic.
- ▶ In which of the following pigments major energy reserves and cell wall are like plants? Chlorophyta
- ▶ Most of the photosynthesis on earth is carried by? Algae
- ▶ The only group of algae having no flagellated motile cells at any stage is? Rhodophyta
- ▶ Brown algae are also known as Phaeophyta
- ▶ Golden algae are also known as Chrysophyta
- ▶ Based on molecular data euglenoids are thought to be closely related to Zooflagellates
- ▶ Most dinoflagellates are Unicellular
- ▶ The most important group of producers in marine ecosystem is of Diatoms
- ▶ The size of Spirochete is? 500  $\mu\text{m}$
- ▶ E. coli and example of enterobacteriace is important for causing diarrheal diseases its size is? 1.1-1.5  $\mu\text{m}$  (width) 2.0-6.0  $\mu\text{m}$  (length)
- ▶ In bacterial categories the bacteria smaller in number are? Ancient bacteria
- ▶ Germ theory of disease has \_\_\_\_\_ postulates? 4
- ▶ Some bacteria ranging occasionally a size of 500  $\mu\text{m}$  in length are? Spirochetes
- ▶ Coccobacillus has a shape similar to? Egg
- ▶ The first bacterium isolated was? Bacillus
- ▶ Which of the following bacteria are thick rigid and spiral? Spirillum
- ▶ A group of 8 cocci is called? Sarcina
- ▶ Which of the following bacteria do not have flagella commonly? Cocci
- ▶ Flagella originate from? Basal body
- ▶ A bacterium with tuft of flagella at both poles is called? Amphitrichous
- ▶ Which of the following structure primarily helps in attachment of bacteria on various surfaces? Pili
- ▶ Which of the following structure provides greater pathogenicity to the bacteria? Slime
- ▶ Cell wall is absent in? Mycoplasma
- ▶ Cell wall of Archaeobacteria does not contain? Peptidoglycan
- ▶ Gram positive bacteria appear? Purple
- ▶ Extremely long molecule of DNA that is tightly folded to fit inside the cell component is called? Chromatin body
- ▶ Which of the following contains genes for drug and disease resistance in bacteria? Plasmid
- ▶ The common waste material in bacteria is? Lactic acid
- ▶ Example of bacteria requiring low



- concentration of oxygen is?
- Campylobacter
- ▶ Purple non-sulphur bacteria is an example of? Photosynthetic bacteria
  - ▶ Those bacteria which are fully dependent upon their host for nutrition are called? Parasitic bacteria
  - ▶ Nitrifying bacteria are the examples of? Chemosynthetic bacteria
  - ▶ E. coli and example of? Facultative bacteria
  - ▶ Spirochete is an example of? Anaerobic bacteria
  - ▶ Sex pili is formed in which of the following processes? Conjugation
  - ▶ Rapid growth at exponential ration occurs in which phase of bacterial growth? Log phase
  - ▶ Chemical substances used on living tissues that inhibit the growth of micro organism are called? Antiseptics
  - ▶ Who developed the vaccine against anthrax? Louis Pasteur
  - ▶ Cyanobacteria have \_\_\_\_\_ cell wall? Gram - ve.
  - ▶ Which of the following help cyanobacteria to locomote? Gas vesicles
  - ▶ Cyanobacteria reproduce by binary fission
  - ▶ Approximately \_\_\_\_\_ species of bacteria are known to cause diseases in humans? 200
  - ▶ Members of Kingdom Protista have characteristics which separate them from other kingdoms
  - ▶ Kingdom Protista do not develop from Blastula or embryo
  - ▶ Kingdom Protista contain ancestors for fungi plants & animals
  - ▶ Who first separated bacteria from other protists as a group? Herbert Copeland
  - ▶ Which of the protozoa has a striking resemblance to collar cells in sponges?
- Choanflagellates
- ▶ Radiolarians belong to which of the following protozoal group? Actinopods
  - ▶ Lime stone deposits are formed from? Foraminiferans
  - ▶ Plasmodium belongs to? Apicomplexans
  - ▶ Which organ break fat to produce cholesterol? Liver
  - ▶ Which will be absorbed fastest through the wall of digestive system? DDT taken as a poison
  - ▶ The anti-malarial drug Quinine is made from a plant. The plant is Cinchona
  - ▶ Shark is not a mammal
  - ▶ Cell Membrane protects the integrity of the interior of the cell.
  - ▶ Centrioles help to organize the assembly of microtubules.
  - ▶ Cilia and Flagella helps in cellular locomotion.
  - ▶ Chloroplasts are the sites of photosynthesis in a plant cell.
  - ▶ Chromosomes carry heredity information in the form of DNA.
  - ▶ Cytoskeleton is a network of fibers that support the cell.
  - ▶ Nucleus controls cell growth and reproduction.
  - ▶ Ribosomes involved in protein synthesis.
  - ▶ Mitochondria provide energy for the cell.
  - ▶ Endoplasmic Reticulum synthesizes carbohydrates and lipids.
  - ▶ Golgi Apparatus manufactures, stores, and ships certain cellular products.
  - ▶ Lysosomes digest cellular macromolecules.
  - ▶ Alternation of generations is absent in Hydrant
  - ▶ Enterobius vermicularis is commonly



known as Pinworm

- ▶ Animals of which class of arthropoda are present everywhere? Insecta
- ▶ Amphibians are considered to be evolved from Dipnoi
- ▶ A shift in pH or temperature can cause a protein to denature or unfold
- ▶ The smallest unit that scientists agree is alive is the cell
- ▶ The region in a human cell that houses the bulk of the genetic material is the nucleus or nuclear region
- ▶ Most of the cellular machinery in human cells is in the cytoplasm or cytoplasmic region
- ▶ Cellular interactions with the environment are controlled by which region of the cell? membrane or membrane associated region
- ▶ The basic structure of a cell's membrane is a phospholipid bilayer with associated proteins that can be either integral or peripheral
- ▶ Receptors in the cell's surface tend to be made of Protein
- ▶ The molecules that allow cells to join and adhere to one another and or objects are made of Protein
- ▶ When a cell is attached to a substrate, the cell's membrane is protected from ripping by membrane proteins which pass the 'external forces from the exterior to the interior of the cell.
- ▶ Tight junctions are membrane junctions which prevent passage of materials between two cells.
- ▶ Gap junctions are membrane junctions which contain hollow channels within them that allow ions to pass through from cell to cell.
- ▶ Desmosomes are membrane junctions which allow force to be passed from cell to cell without separation of, or damage to, the cellular membranes.
- ▶ When a molecule moves from an area of high concentration to an area of low concentration, the process is called diffusion
- ▶ Molecules can passively diffuse through the plasma membrane with the aid of channel proteins, which form a tunnel that specific molecules can travel, and carrier proteins, which bind to a molecule and change shape so that un-binding occurs on the opposite side of the membrane.
- ▶ If a molecule can only pass through a membrane with the assistance of a membrane protein, but the direction of its travel is controlled only by its concentration, the process is called facilitated diffusion.
- ▶ When water moves from an area where there is more water to an area where there is less, the process is called Osmosis
- ▶ A complex substance which on hydrolysis yields polyhydroxy aldehyde or ketone subunits is called? Carbohydrate
- ▶ Chromosomes are made up of DNA and proteins
- ▶ How many bits is a byte? 8
- ▶ Computers calculate numbers in what mode? Binary
- ▶ The explosion that is said to have begun the universe is called the Big Bang
- ▶ What color is sulfuric acid? Colorless
- ▶ The most abundant constituent of atmospheric air is Nitrogen
- ▶ Plants are called the lungs of nature.
- ▶ Membranes of the grane are sites where sunlight is trapped
- ▶ The simplest of oxygen producing photosynthetic organisms are Cyanobacteria
- ▶ Protein coats of viruses are synthesized in Lytic cycle
- ▶ Mycoplasmas have been included in



bacteria because lack membrane bounded organelles

- ▶ Yeasts reproduce asexually by forming buds
- ▶ The one which can tolerate highest external osmotic pressure? Fungi
- ▶ Locomotory structures are not found in apicomplexans group
- ▶ Blood, Bones and Cartilage are made up of a special type of tissue? Connective tissue
- ▶ What is Celluloses? Carbohydrates
- ▶ The pH of human blood is 7.4
- ▶ Jaundice exhibits the malfunctioning of which organ? Liver
- ▶ You want to convert biodegradable waste into useful substance. What additional thing do you need? Bacteria
- ▶ Which animals do not have jaws? Aptiles
- ▶ Development of pale chalky white colour and pits on the surface of teeth indicates the excessive intake of Fluorine
- ▶ Death in Carbon dioxide atmosphere occurs due to? Suffocation
- ▶ Detergents usually release Phosphates
- ▶ Diphtheria is pathogenic disease
- ▶ Diabetes is not nutritional disease?
- ▶ What is the pH of water? 7.0
- ▶ Human nails are made up of Keratin
- ▶ What is the scientific term for high blood pressure? Hypertension
- ▶ What cell component is commonly used for personal identification? DNA
- ▶ What method is used to kill the bacteria in milk? Pasteurization
- ▶ Which is the largest artery in the body? Aorta
- ▶ About how many pints of blood are there in the Human body? 8
- ▶ Which bone is located in the collar

region of the human body? Clavicle

- ▶ What is the correct name for the nerve cell? The neuron
- ▶ What part of eyes adjusts to focus more clearly? Lens
- ▶ Nitrogen, phosphorous and potassium are key agro-nutrients for crops.
- ▶ Which organism is helpful in making the soil more fertile? Earthworm
- ▶ What is the pituitary gland attached to? Brain
- ▶ How many joints are there in the Human body? 230
- ▶ How many chromosomes are there in the human gene? 46
- ▶ Where is human appendix located? Right side
- ▶ Which blood group is known as Universal recipient? Group AB
- ▶ Where is the tympanic membrane found? Ear
- ▶ Taxidermy means stuffing dead animals
- ▶ pH of gastric juice is 1.4
- ▶ What is the cause of Malaria? Protozoa
- ▶ What is the smallest unit of life? Cell
- ▶ pH of urine is 6.0
- ▶ The smallest of all human cells are RBCs
- ▶ Which type of cells has no nucleus? Red blood cells
- ▶ Vitamin C can easily be lost in cooking and food storage
- ▶ Vitamin D is essential for calcium metabolism.
- ▶ Riches source of Vitamin A is eggs
- ▶ Deficiency of Calcium leads to rickets
- ▶ Which vitamin easily prepared in body by sun light? Vitamin D
- ▶ Which vitamin help to improve the absorption of calcium and phosphorous? Vitamin D



- ▶ Which vitamin helps to supply oxygen to blood? Vitamin E
- ▶ Vitamin C (chemical name Ascorbic Acid) is essential for appetite. Deficiency of Vitamin C causes Scurvy.
- ▶ Which vitamin is essential for coagulation of blood? K
- ▶ Deficiency of Vitamin A causes night blindness
- ▶ Deficiency of Vitamin C causes Teeth disease
- ▶ Who gave the Theory of Evolution? Darwin
- ▶ Who gave the Laws of Heredity? Gregory Mandel
- ▶ Who gave the Laws of Natural Selections? Darwin
- ▶ Blood sugar level is controlled by hormone called Insulin
- ▶ Purity of milk is measured by instrument called Lactometer
- ▶ Dendrology is the study of trees.
- ▶ Histology deals with organic tissues
- ▶ White blood cells are also known as Leucocytes
- ▶ Red blood cells (RBC) are also known as Erythrocytes
- ▶ Pepsin produced in stomach which helps to digest the Proteins
- ▶ Malarial Parasite was invented by Ronald Ross
- ▶ Godfrey Hounsfield (Britain) invented the CAT Scanner in 1968
- ▶ What do doctors look at through an ophthalmoscope? The eye
- ▶ Polio, AIDS and Measles are caused by Virus & T.B., whooping cough and diphtheria are caused by Bacteria
- ▶ Female mosquito Aedes Aegypties is the cause of Dengue fever
- ▶ Blood Sugar is measured in mg/deciliter & Blood pressure is measured in mmHg
- ▶ Atmospheric pressure at sea level is 760 mm
- ▶ Entomology is the study of insects.
- ▶ Tuberculosis was once known as white plague
- ▶ 1 calorie is equal to 4.2 Joules
- ▶ Scientists have discovered human footprints in England that are at least 800,000 years old the most ancient found outside Africa, and the earliest evidence of human life in Northern Europe in January 2014.
- ▶ Man eat both plants and animals is called Omnivore
- ▶ Pepsin produced in stomach digests the Proteins
- ▶ Polio is caused by Virus
- ▶ Hummingbird has legs but can't walk
- ▶ Tears are produced by lachrymal glands
- ▶ In human eye image is formed at Retina
- ▶ A patient is put to Dialysis, when he or she suffers from Kidney ailment
- ▶ Leprosy is caused by Bacteria
- ▶ The largest organ of human body is Skin
- ▶ A universal blood donor has blood group is O
- ▶ The mammal which lays eggs is Duck-billed platypus
- ▶ The most abundant mineral in the human body is Calcium
- ▶ Which gases is mainly causing global warming? Carbon dioxide
- ▶ Earth is most dense, watery, bios planet.
- ▶ SARS' stands for Severe Acute Respiratory Syndrome
- ▶ Muslim scientist Ali al Tabari is famous for his work on medical sciences
- ▶ Gene is the smallest unit of heredity
- ▶ A substance that alters (usually



increases) the rate at which a reaction occurs is called Catalyst.

- ▶ Dengue is also known as Break-bone fever
- ▶ Erythrocytes, leucocytes and platelets are collectively constituted nearly how much percent of the blood? 45 per cent
- ▶ Which substance was the first organic chemical to be synthesized from an inorganic source? Urea
- ▶ Which gas is used for converting vegetable oils into saturated fats?  $H_2$
- ▶ Which is used in the preparation of antiseptic solution? Iodine
- ▶ Which plant eat insects? Pitcher plant
- ▶ Cholera is a Bacterial Disease
- ▶ Diphtheria is a Bacterial Disease
- ▶ Which is the Main source of energy for human brain? Glucose
- ▶ What is the meaning of virus? Poison
- ▶ Hepatitis is a Viral Disease
- ▶ What organelle is known as the 'brain' of the cell? Nucleus
- ▶ Kidney produces urea in the human body
- ▶ What gas plants contribute to the earth's atmosphere? Oxygen
- ▶ Human breath is visible in winter but not in summer because water vapour in breath condenses in cold air, making it visible
- ▶ Acid rain contains high levels of Sulphuric and nitric acids
- ▶ What system our brain is in? Nervous system
- ▶ Tetanus is a Bacterial Disease
- ▶ Ringworm is a disease caused by Fungi
- ▶ There are four kinds of malaria that can infect humans. They are all spread by what? A mosquito bite
- ▶ The effect of hormones on the body is Catalytic function

Enzyme is a Bio-catalyst

- ▶ Development of Goitre (enlarged thyroid gland) is mainly due to deficiency of? Iodine
- ▶ The enzyme that converts glucose to ethyl alcohol is Invertase
- ▶ The endocrine system chemically controls the various functions of cells, tissues, and organs through the secretion of hormones
- ▶ What part of the body do these malaria parasites feed on? Red blood cells
- ▶ How long must a malaria parasite grow in its host before infection can be spread to a human being? A week or more
- ▶ Once malaria parasites enter a person's blood they then travel to which organ? Liver
- ▶ At what point the Centigrade and the Fahrenheit temperatures are the same?  $-40$  degree
- ▶ In a standard drug test, which seeds can cause false positive results for opium use? Poppy
- ▶ Epiphytic and parasitic plants grow on? Plants
- ▶ The branch of study dealing with old age and aging is called Gerontology
- ▶ If a green leaf is seen in a red light its colour will be black
- ▶ What now rare disease is characterized by difficulty in breathing, sore throat, and swelling of the neck? Diphtheria
- ▶ Which acute infection is characterized as acute bacterial pneumonia with headache, high fever, dry cough followed by a productive cough, chills, shortness of breath, diarrhea, and abdominal pain? Legionnaire's disease
- ▶ Which infection is characterized by a gradual onset with headache, fatigue, dry cough, sore throat, and occasionally chest discomfort and rash? Mycoplasmal pneumonia



- ▶ Which organ is affected by Arthritis? Joints
- ▶ Which organ is affected by Meningitis? Brain
- ▶ What is the largest organ inside the human body? Liver
- ▶ What is the largest organ of the human body? Skin
- ▶ How many bones are there in the adult human body? 206
- ▶ The first sign of life made its appearance on the earth about 3 billion years ago
- ▶ When the earth was formed it had an atmosphere with Water vapour, Ammonia and Methane
- ▶ Biochemical origin of life was discovered by Oparin
- ▶ A group of cells that work together to perform a function is called what? Tissue
- ▶ Fungi absorb the nutrients from dead organisms. In the animal kingdom, fungi are known as what? Decomposers
- ▶ Which cell organelles does not participate in cellular division? Ribosomes
- ▶ An animal that consumes only meat or other animals, is called a what? Carnivore
- ▶ The longest bone in the body of human being is femur
- ▶ The shortest bone in the human body is the stapes
- ▶ The most important foods are derived from fruits
- ▶ Most highly intelligent mammals (except man) are Dolphins
- ▶ The eukaryote has a nucleus
- ▶ A nucleus is missing in prokaryote
- ▶ Animals which eat both plants and other animals are known as what? Omnivores
- ▶ Bacterial infections in humans can be treated with what? Antibiotics
- ▶ Which would you NOT find in a bacterial cell? Golgi apparatus
- ▶ Which is found in plant cells, but not in animal cells? Cell wall
- ▶ The jellylike interior of the cell is called the cytoplasm
- ▶ What part of the cell makes proteins? Ribosomes
- ▶ What is the most important stimulant in tea leaves? Caffeine
- ▶ What do you know about Dolly? First cloned sheep
- ▶ Epidemic Typhus is a Bacterial Disease
- ▶ Impetigo is a Bacterial Disease
- ▶ What part of the cell serves to process, package and export proteins? Golgi apparatus
- ▶ What is the Chemical name of the salt we use in our kitchen? Sodium Chloride
- ▶ What is the coloured part of the eye called? Iris
- ▶ What do we call the tubes that carry blood away from the heart? Arteries
- ▶ What are the tiny bumps on the tongue called? Taste buds
- ▶ Which organ is affected by Pneumonia? Lungs
- ▶ Which disease is transmitted from water and possibly dust, but not person-to-person? Legionnaire's disease
- ▶ Which disease has a bovine form, which results from exposure to infected cattle or ingestion of contaminated milk? Tuberculosis
- ▶ What is the incubation period for Whooping Cough? 6 to 20 days
- ▶ What is the incubation period for tuberculosis? 4 to 12 weeks
- ▶ DPT vaccine is given to children to immunize them against Diphtheria, whooping cough and tetanus
- ▶ Tetanus is also known as Lockjaw



- ▶ What is the pathogen that causes tetanus? *Clostridium tetani*
- ▶ Which organ of human body is affected by Conjunctivitis disease? Eyes
- ▶ The vaccination against small pox involves the introduction of weakened germs
- ▶ Which organ of human body is affected by Cataract disease? Eyes
- ▶ What part of the body does tetanus affect the most? Nerves
- ▶ A PPD skin test is used to diagnose the Tuberculosis
- ▶ "Green House Effect" means trapping of solar energy due to atmospheric carbon dioxide
- ▶ 'Sucking the muck' is the common operating room nickname for procedure of? Liposuction
- ▶ The golden age of Dinosaurs was Mesozoic
- ▶ The oldest era is Proterozoic
- ▶ What substances are produced by the endocrine glands? Hormones
- ▶ John Glenn was the first man to eat in space. What did he eat? Applesauce
- ▶ What is the pathogen that causes typhoid fever? *Salmonella typhi*
- ▶ Which is used for correcting myopic eyes? Concave Lens
- ▶ Brucellosis is a Bacterial Disease
- ▶ Cat Scratch Disease is a Bacterial Disease
- ▶ Tularemia is a Bacterial Disease
- ▶ Typhoid Fever is a Bacterial Disease
- ▶ Aspergillosis is a Fungal infectious disease
- ▶ What is the incubation period for typhoid fever? 3 days to 3 months
- ▶ What part of the body does anthrax not affect? Blood
- ▶ What is the pathogen that causes anthrax? *Bacillus anthracis*
- ▶ What is the incubation period for anthrax? A few hours to 7 days
- ▶ What is the incubation period for cholera? A few hours to 5 days
- ▶ What do we call the openings in the skin? Pores
- ▶ What is the waste gas made that humans breathe out? Carbon dioxide
- ▶ How many senses are there? 5
- ▶ How many ribs does a human have? 24
- ▶ What is the black part of the eye called? Pupil
- ▶ Which is used as laughing gas? Nitrous oxide
- ▶ Which Chemical is used for fruit ripening? Calcium carbide
- ▶ Which is an air pollutant gas and is released by burning of fossil fuel? Sulphur dioxide
- ▶ Which element/ion is essential in small quantities for development of healthy teeth but causes mottling of the teeth if consumed in higher quantities? Fluoride
- ▶ What do we call the tubes that carry blood towards the heart? Veins
- ▶ What do we call the muscular bag inside the body? Stomach
- ▶ What part of the body exchanges gases with air? Lungs
- ▶ What do we call the tubes where food is digested? Intestines
- ▶ Which organ is sometimes removed from the body and replaced with a new one? Heart
- ▶ What is the gas that humans breathe? Oxygen
- ▶ A cockroach has three pairs of walking legs
- ▶ Which metal is used for making boats because it does not corrode by seawater? Nickel
- ▶ Which is a strong smelling agent added



to LPG cylinder to help in the detection of gas leakage? Thioethanol

- ▶ Which substance evolves heat when dissolved in water? Calcium oxide
- ▶ Dead organs are generally stored in formalin. Formalin is Aqueous formaldehyde
- ▶ Bat is a mammal who fly
- ▶ A balance diet contains all food nutrients for growth and maintenance
- ▶ A "clinical death" take place when all the three conditions are present together
- ▶ A "biological death" take place when all the body cells die after a few hours of clinical death
- ▶ Chromosomes consist of DNA and proteins
- ▶ Cockroach cannot survive in the water because it's respiratory organ is Trachea
- ▶ Spleen is known as 'graveyard' of RBCs
- ▶ Which pairs has open type of circulatory system? Cockroach and Silverfish
- ▶ Who is responsible for converting milk into curd? Bacteria
- ▶ Lyme disease is a Bacterial Disease
- ▶ Pertussis is a Bacterial Disease
- ▶ In how many groups can human blood be divided? 4
- ▶ Diamond is used for cutting glass, marble stones and other hard materials
- ▶ What do you call an infection in the body where pus collects? Abscess
- ▶ If we multiply force by its duration, what quantity will we get? Impulse
- ▶ What is the time required for half a radioactive substance to decay? Half life
- ▶ Temperature generally decreases towards the poles because progressively lesser solar energy per unit area falls on the earth's surface as we move to polar regions
- ▶ What part of the stamen of a flower bears the pollen grains? Anther
- ▶ What is the pathogen that causes cholera? *Vibrio cholerae*
- ▶ What age group is the most likely to be affected by acne? Adolescents
- ▶ What is the pathogen that causes acne? *Propionibacterium*
- ▶ Which medicine is administered to patients suffering from diabetes? Insulin
- ▶ What is the main cause of Cryptosporidiosis? Contaminated drinking water
- ▶ Which disease still remains a challenge for science? Cancer
- ▶ What type of virus causes mumps? Paranyxovirus
- ▶ Herpes is a Viral Disease
- ▶ At 4 degree C, volume of a certain mass of water is Minimum
- ▶ Influenza is caused by a Virus
- ▶ Dog bite can cause rabies. Which among the following other animals can also cause rabies? Donkey
- ▶ Pneumonia is a Bacterial Disease
- ▶ One of the chemical messengers produced by endocrine glands are called hormones
- ▶ Ethylene is a name of hormone, produced by Plants
- ▶ Ecdysone is a name of hormone, produced by Insects
- ▶ Name the gland which secretes many hormones and controls the function of other endocrine glands? Pituitary gland
- ▶ Insulin is a peptide hormones produced by endocrine cells of Pancreas
- ▶ Glucagon is a peptide hormones produced by endocrine cells of Pancreas
- ▶ Biogenesis is a term in biology that is derived from two Greek words meaning



- what? Life and Death
- ▶ When water itself combines chemically with some element or mineral it is called Hydration
  - ▶ Which is fundamentally the Rh factor? An antigen-antibody reaction
  - ▶ 'Cod' is a variety of Fish
  - ▶ A large number of identical plants can be obtained in a short span of time through Tissue culture technique
  - ▶ The poison of honey bee is acidic
  - ▶ Pineal Gland is an Endocrine gland that involved in biological rhythms
  - ▶ Relays sensory information between the cerebrum and cerebellum is called Pons
  - ▶ Wernicke's Area is a region of the brain where spoken language is understood
  - ▶ Cerebral Peduncle is an anterior portion of the midbrain consisting of large bundles of nerve fiber tracts that connect the forebrain to the hindbrain
  - ▶ The heart and the circulatory system together form the cardiovascular system.
  - ▶ Atria are the upper two chambers of the heart.
  - ▶ Ventricles are the lower two chambers of the heart.
  - ▶ The heart wall consists of three layers
  - ▶ Epicardium is the outer layer of the wall of the heart.
  - ▶ Myocardium is the muscular middle layer of the wall of the heart.
  - ▶ Endocardium is the inner layer of the heart.
  - ▶ Cardiac Conduction is the rate at which the heart conducts electrical impulses. Heart nodes and nerve fibers play an important role in causing the heart to contract.
  - ▶ Atrioventricular Bundle is the bundle of fibers that carry cardiac impulses.

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- ▶ Atrioventricular Node is a section of nodal tissue that delays and relays cardiac impulses.
  - ▶ Purkinje Fibers are the fiber branches that extend from the atrioventricular bundle.
  - ▶ Sinoatrial Node is a section of nodal tissue that sets the rate of contraction for the heart.
  - ▶ The Cardiac Cycle is the sequence of events that occurs when the heart beats.
  - ▶ There are the two phases of the cardiac cycle
  - ▶ The heart ventricles are relaxed and the heart fills with blood is called Diastole Phase.
  - ▶ The ventricles contract and pump blood to the arteries is called Systole Phase.
  - ▶ Heart valves are flap-like structures that allow blood to flow in one direction. Below are the four valves of the heart:
  - ▶ Aortic Valve prevents the back flow of blood as it is pumped from the left ventricle to the aorta.
  - ▶ Mitral Valve prevents the back flow of blood as it is pumped from the left atrium to the left ventricle.
  - ▶ Pulmonary Valve prevents the back flow of blood as it is pumped from the right ventricle to the pulmonary artery.
  - ▶ Tricuspid Valve prevents the back flow of blood as it is pumped from the right atrium to the right ventricle.
  - ▶ Blood vessels are intricate networks of hollow tubes that transport blood throughout the entire body.
  - ▶ Aorta is the largest artery in the body of which most major arteries branch off from.
  - ▶ Brachiocephalic Artery carries oxygenated blood from the aorta to the head, neck and arm regions of the body.
  - ▶ Carotid Arteries supply oxygenated



- ▶ blood to the head and neck regions of the body.
- ▶ Common iliac Arteries carry oxygenated blood from the abdominal aorta to the legs and feet.
- ▶ Coronary Arteries carry oxygenated and nutrient filled blood to the heart muscle.
- ▶ Pulmonary Artery carries de-oxygenated blood from the right ventricle to the lungs.
- ▶ Subclavian Arteries supply oxygenated blood to the arms.
- ▶ Blood vessels are intricate networks of hollow tubes that transport blood throughout the entire body.
- ▶ Blood vessel endothelium is continuous with the inner tissue lining of organs such as the brain, lungs, skin, and heart. In the heart, this inner layer is called the endocardium.
- ▶ Arteries are elastic vessels that transport blood away from the heart.
- ▶ Pulmonary arteries carry blood from the heart to the lungs where oxygen is picked up by red blood cells. Systemic arteries deliver blood to the rest of the body.
- ▶ Veins are elastic vessels that transport blood to the heart. Veins can be categorized into four main types: pulmonary, systemic, superficial, and deep veins.
- ▶ Capillaries are extremely small vessels located within the tissues of the body that transport blood from the arteries to the veins.
- ▶ Fluid exchange between capillaries and body tissues takes place at capillary beds.
- ▶ Sinusoids are extremely small vessels located within the liver, spleen, and bone marrow.
- ▶ Blood is circulated through the body via the cardiovascular system.
- ▶ This system is comprised of the heart and the circulatory system.
- ▶ Blood vessels carry blood from the heart to all areas of the body.
- ▶ The blood travels from the heart via arteries to smaller arterioles, then to capillaries or sinusoids, then to venules, to veins, and back to the heart.
- ▶ Microcirculation deals with the flow of blood from arterioles to capillaries or sinusoids to venules.
- ▶ As blood moves through the capillaries, substances such as oxygen, carbon dioxide, nutrients, and wastes are exchanged between the blood and the fluid that surrounds cells.
- ▶ Cardiovascular system is comprised of the heart, blood, and blood vessels. The beating of the heart drives the cardiac cycle which pumps blood throughout body.
- ▶ Lymphatic system is a vascular network of tubules and ducts that collect, filter, and return lymph to blood circulation.
- ▶ As a component of the immune system, the lymphatic system produces and circulates immune cells called lymphocytes.
- ▶ The digestive system breaks down food polymers into smaller molecules to provide energy for the body.
- ▶ Digestive juices and enzymes are secreted to break down the carbohydrates, fat, and protein in food.
- ▶ The endocrine system regulates vital processes in the body including growth, homeostasis, metabolism, and sexual development.
- ▶ Endocrine organs secrete hormones to regulate body processes.
- ▶ The integumentary system protects the internal structures of the body from damage, prevents dehydration, stores fat and produces vitamins and hormones.
- ▶ The muscular system enables movement through the contraction of muscles.



The nervous system monitors and coordinates internal organ function and responds to changes in the external environment.

The reproductive system enables the production of offspring through sexual reproduction.

The reproductive system is comprised of male and female reproductive organs and structures which produce sex cells and ensure the growth and development of offspring.

▶ The respiratory system provides the body with oxygen via gas exchange between air from the outside environment and gases in the blood.

▶ The skeletal system supports and protects the body while giving it shape and form.

▶ The urinary/excretory system removes wastes and maintains water balance in the body.

▶ The word tissue is derived from a Latin word meaning to "weave."

▶ Cells that make up tissues are sometimes "woven" together with extracellular fibers. Likewise, a tissue can sometimes be held together by a sticky substance that coats its cells.

▶ There are four main categories of tissues: epithelial, connective, muscle and nervous.

▶ Epithelial tissue covers the outside of the body and lines organs, vessels (blood and lymph), and cavities.

▶ Epithelial cells form the thin layer of cells known as the endothelium, which is continuous with the inner tissue lining of organs such as the brain, lungs, skin, and heart.

▶ The free surface of epithelial tissue is usually exposed to fluid or the air, while the bottom surface is attached to a basement membrane.

▶ The cells in epithelial tissue are very closely packed together and joined with little space between them.

▶ Epithelial tissue protects the internal structures of the body from damage and dehydration.

▶ Epithelial tissue also helps to protect against microorganisms. The skin is the body's first line of defense against bacteria, viruses, and other microbes.

▶ Epithelial tissue functions to absorb, secrete, and excrete substances.

▶ Epithelial tissue also has a sensory function as it contains sensory nerves in areas such as the skin, tongue, nose, and ears.

▶ Ciliated epithelial tissue can be found in areas such as the female reproductive tract and the respiratory tract.

▶ Epithelia are commonly classified based on the shape of the cells on the free surface, as well as the number of cell layers. Sample types include:

▶ The cell nucleus is a membrane bound structure that contains the cell's hereditary information and controls the cell's growth and reproduction.

▶ The nucleus regulates the synthesis of proteins in the cytoplasm through the use of messenger RNA (mRNA).

▶ Messenger RNA is a transcribed DNA segment that serves as a template for protein production. It is produced in the nucleus and travels to the cytoplasm through the nuclear pores of the nuclear envelope.

▶ Once in the cytoplasm, ribosomes and another RNA molecule called transfer RNA work together to translate mRNA to produce proteins.

▶ The cell nucleus is only one type of cell organelle. The following cell structures can also be found in a typical animal eukaryotic cell:

▶ Eukaryotes include animals, plants, fungi and protists (ex. algae). Typically, eukaryotic cells are more complex and much larger than prokaryotic cells.

▶ On average, prokaryotic cells are about 10 times smaller in diameter than



eukaryotic cells.

- ▶ Cell Membrane is found in both Prokaryotic Cells and Eukaryotic Cells
- ▶ Birds which swim in water have webbed feet
- ▶ Which food items is rich in iron? Apple
- ▶ The normal cholesterol level in human blood is 180-200 mg
- ▶ Which is the longest nerve? Sciatic
- ▶ The Dried flower buds are used as a spice in Cloves
- ▶ In a food chain, the solar energy utilized by plants is only 0.1 percent
- ▶ Which actions is related with evaporation of sweat? Endothermic Action
- ▶ The Proteobacteria are a major group (phylum) of gram-negative bacteria. They include a wide variety of pathogens such as *Escherichia*, *Salmonella*, *Vibrio*, *Helicobacter*, and *Yersinia*, and many other notable genera
- ▶ Coral is of organic origin?
- ▶ What rays of sunlight are mostly utilized by chlorophyll in photosynthesis? Red
- ▶ Opium is obtained from which part of the poppy plant? Unripe Fruits
- ▶ An important ancillary product used in the petrochemicals industry is Naphtha
- ▶ Which is required for the formation of bones and teeth? Calcium and Phosphorus
- ▶ Plague is a Bacterial Disease
- ▶ Q fever is a Bacterial Disease
- ▶ CT Scan is done by using X-rays
- ▶ White blood cells act as a defence against infection
- ▶ % of Glucose normally present in our blood is 0.08%
- ▶ Starch cellulose and glycogen yield \_\_\_\_\_ on complete hydrolysis?  
Glucose
- ▶ For the synthesis of 10g of glucose of energy is required? 717.6 Kcal
- ▶ Which one is abundant in animals? Glycogen
- ▶ Which one is soluble in hot water? Amylose
- ▶ The covalent bond between two monosaccharide subunits is called? Glycosidic Bond
- ▶ Which one gives blue colour with iodine? Starch
- ▶ Which of the following polysaccharide is called animal starch? Glycogen
- ▶ Cotton is example of pure form of cellulose
- ▶ Lipids are soluble in Ether
- ▶ Lipid molecules can store double amount of energy as compared to same amount of carbohydrate because of high number of C-H bonds
- ▶ A compound produced as a result of a chemical reaction of an alcohol with an acid in which water molecule is released is called? Neutral lipid
- ▶ Fatty acids containing 18 C atoms and a single double bond is? Oleic Acid
- ▶ Which one the following fatty acid is more soluble in an organic solvent and has higher melting point? Palmitic acid
- ▶ Fats containing unsaturated fatty acid contain double bond
- ▶ Fats containing unsaturated fatty acid are lighter than water
- ▶ Specific gravity of fats containing unsaturated fatty acid is less than 1
- ▶ Animals obtain carbohydrates mainly from? Starch
- ▶ Peptide bond is? C-N link
- ▶ Proteins comprise of \_\_\_\_\_% of the total dry weight of a cell? 50%
- ▶ Proteins are polymers of Amino acids
- ▶ The element in basic structure of



- proteins which differentiate them from carbohydrates is S
- ▶ Total number of amino acids discovered so far in cells and tissues are 170
  - ▶ In Glycin an amino acid R group is replaced by H
  - ▶ A bond formed by linkage between -OH of carboxyl group of one amino acid and H of amino group of another amino acid which releases water is called Peptide bond
  - ▶ Total number of amino acids in a hemoglobin molecule are 574
  - ▶ An insulin molecule consists of \_\_\_\_\_ polypeptide chains? 2
  - ▶ Which structure of protein gives information about number and sequence of amino acids in it? Primary structure
  - ▶ In an aqueous environment the most stable tertiary conformation is that in which \_\_\_\_\_ amino acids are buried inside the conformation? Hydrophobic
  - ▶ Hemoglobin molecule exhibits which structural organization of proteins? Quaternary structure
  - ▶ ?- helical structure is kept by the formation of \_\_\_\_\_ bonds among amino acids molecules? H bonds
  - ▶ Which of the following does not show quaternary structure? Fibrin
  - ▶ Which structural organization is most common in globular proteins? Tertiary
  - ▶ Actin and myosin are the basic proteins involved in contractile machinery of our body to which type of proteins do they belong? Fibrous Proteins
  - ▶ Antibodies play important role against microorganisms and other pathogens to which type of proteins do they belong? Globular proteins
  - ▶ ATP is a an important molecule for its major function? As an energy currency of the cell
  - ▶ Each turn of DNA contain \_\_\_\_\_
- nitrogenous base pairs? 10
- ▶ The first organism of whose genome was completely discovered was? Hemophilus Influenza
  - ▶ The pentose sugar in RNA is Ribose.
  - ▶ RNA is present in the nucleoli
  - ▶ RNA may be folded back on itself to give double helical characteristics.
  - ▶ rRNA constitutes \_\_\_\_\_ % of the total cellular RNA? 80%
  - ▶ There are mainly \_\_\_\_\_ types of tRNA? 20
  - ▶ Most of the cellular secretions are \_\_\_\_\_ in nature? Glycoproteins
  - ▶ Which conjugated molecules play important role in gene expression? Nucleohistones
  - ▶ The survival of an animal depends upon its ability to take some from its environment? Organic molecules
  - ▶ Non polar organic molecules are \_\_\_\_\_ in water? Insoluble
  - ▶ In living organisms the lubricant which provides protection against damage resulting from friction is? Water
  - ▶ In  $C_x(H_2O)_y$  x ranges from 3 to many thousand
  - ▶ Glycolipids and glycoproteins have structural role in the \_\_\_\_\_ matrix of animal and bacterial cell? Extracellular
  - ▶ The trioses which are intermediate in respiration and photosynthesis are Glyceraldehydes & Dihydroxy acetone
  - ▶ Keto group is represented as CO
  - ▶ The monosaccharide found in some bacteria and occurring rarely are Tetroses
  - ▶ How many carbon atoms are required to form a furan ring (ribofuranose)? 4
  - ▶ In esterification OH comes from Alcohol
  - ▶ Triglyceride is also known as? Neutral lipid
  - ▶ Which one is not found in fatty acids in



acylglycerols? C-25

- ▶ Animals fats are \_\_\_\_\_ at room temperature? Solids
- ▶ Biological molecules (proteins) which catalyze a biochemical reaction and remain unchanged after completion of reaction are called Enzymes
- ▶ Some enzymes consist solely of protein with no non protein part.
- ▶ Enzymes catalyze a chemical reaction without being utilized.
- ▶ All enzymes are no fibrous Proteins
- ▶ Enzymes without their cofactor are called apoenzyme.
- ▶ In which location enzymes controlling cellular respiration are present? Mitochondria
- ▶ An activated enzyme consisting of polypeptide chain and a cofactor is called holoenzyme or activated enzyme
- ▶ Which one forms the raw material for coenzymes? Vitamins
- ▶ A cofactor made of inorganic ion which is detachable is called activator
- ▶ Enzymes decreases the activation energy of a chemical reaction
- ▶ Which step causes activation of catalytic site of an enzyme? Formation of Enzyme Susstrate complex.
- ▶ Lock and Key model was proposed by? Emil Fischer
- ▶ Lock and Key Model? A. Specific enzyme can transform only a specific substrate B. Active site of an enzyme is a non flexible structure. C. Active site does not change before during or even after the reaction.
- ▶ The rate of reaction is directly proportional to the concentration of an enzyme
- ▶ Increase in enzyme molecule increases the available active sites.
- ▶ If the concentration in enzyme is doubled the rate will become two fold
- ▶ If the concentration of enzyme is kept constant and amount of substrate is increased a point is reached where increase in substrates concentration does not affect the reaction rate because of all the active sites on enzyme molecule are occupied.
- ▶ If more substrate to already occurring enzymatic reaction is added more enzyme activity is seen because of there is probably more enzyme available than there is substrate.
- ▶ If more substrate to already occurring enzymatic reaction is added and there is no effect on the rate of the reaction what is the form given to this situation? Saturation
- ▶ The active site of an enzyme? Determined by structure and the specificity of the enzyme
- ▶ Excessive increase in temperature of medium causes the enzyme molecule to? Denatured
- ▶ Extreme change in pH results in? Denaturation of the enzyme
- ▶ Optimal temperature of enzymes present in human body is? 37°C
- ▶ A chemical substance which can react (in place of substrate) with the enzyme but is not transformed into product/s and thus blocks the active site temporarily or permanently is called? Inhibitor
- ▶ Inhibitors which block the enzyme by forming weak bond are called Competitive inhibitors & Non-competitive inhibitors
- ▶ A substance which binds at the active site of the enzyme but does not result in the formation of the products is called? Competitive inhibitor
- ▶ The structure of an enzyme is altered by? Irreversible inhibitor
- ▶ Malonic acid is an example of? Competitive inhibitor
- ▶ If enzyme concentration is low than substrate pH and temperature values



- Prepared by \_\_\_\_\_ for Botany & Zoology
- are equal to requirement then increase in concentration of enzyme
- Who coined the term CELL? Robert Hook
- Who opposed the idea the cell is an empty space bounded by thick wall? Robert Brown
- Who first observed and thus hypothesized that new cells are formed from previously existing living cell? Rudolph Virchows
- Magnifying power of electron microscope as compared to eye is? 250000X
- Percentage of proteins in cell membrane is? 60-80%
- Cell membrane contains protein molecules embedded in lipid bilayer
- Cell membrane is a differentially permeable membrane.
- Cell membrane may get infolded to engulf solid or liquid material.
- Movement of the material across the cell membrane which does not requiring expenditure of metabolic energy is called? Passive transport
- The first layer of cell wall which is formed is? Primary wall
- Cellulose is the major component of? Primary wall
- Strengthening material of prokaryotic cell wall is? Peptidoglycan or Murein.
- Spherical or tubular membranes which separate the material present in endoplasmic reticulum from that of cytoplasmic material are called? Cisternae
- Which is not the function of endoplasmic reticulum? Synthesis of conjugated molecules
- Factory of ribosomal synthesis is? Nucleolus
- 60S and 40S subunit combine to form \_\_\_\_\_ particle? 80 S
- ▶ A group of ribosomes attached to mRNA is known as? Polysomes
- ▶ Pancreas produces secretory granules that help in digestion. These granules after passing through endoplasmic reticulum are pinched off from \_\_\_\_\_ surface of Golgi apparatus? Maturing face
- ▶ During digesting the phagocytosed food particles vesicles formed from fusion of phagocytic vacuole with the enzymes secreted by Golgi apparatus are called? Secondary lysosomes
- ▶ Autophagosomes are those lysosomes which eat parts of their own cells to generate energy.
- ▶ Autophagosomes are those lysosomes which eat old and worn out cellular organelles.
- ▶ Cellular organelles related with  $H_2O_2$  are Peroxisomes
- ▶ Glyoxisomes contain enzymes which help in conversion of fatty acids into carbohydrate
- ▶ Glyoxisomes are abundant in soyabeans but absent in pea.
- ▶ Glyoxisomes are single membranous organelles
- ▶ Which of the following cytoskeletal fiber contain tubulin protein? One which help in assembly of spindles during mitosis
- ▶ Centrioles are composed of \_\_\_\_\_ triplets of microtubules? 15
- ▶ The human naked eye can differentiate between two points which are \_\_\_\_\_ apart? 1.0 mm
- ▶ Ribonucleo-protein particles are the name of? Eukaryotic ribosomes
- ▶ Ribosomes + m-RNA? Polysome
- ▶ In golgi apparatus the maturing face is? Concave
- ▶ Proteins and lipids are converted into glycolipids and glycoproteins by adding carbohydrates by? Golgi apparatus
- ▶ Amoeboid movements and movement



- of cyclosis is due to? Microfilaments
- ▶ Of the following which one is not the characteristic of mitochondria? Number of mitochondria is constant
  - ▶ Chlorophyll is a/an \_\_\_\_\_ molecule? Organic
  - ▶ The part of chloroplast where CO<sub>2</sub> is fixed to manufacture sugar is? Stroma
  - ▶ The type of plastids which help in pollination is? Chromoplasts
  - ▶ Ribosomes are assembled in? Nucleolus
  - ▶ The place of centromere where spindle fibres get attached is? Kinetochore
  - ▶ Which of the following is not present in mitochondria? Thylakoids
  - ▶ The spent energy in the form of ADP is regenerated by mitochondria into? ATP
  - ▶ Which of the following combination is an example of self replicating organelles? Mitochondria Chloroplast
  - ▶ Chlorophyll molecule contains \_\_\_\_\_ as central metal ion? Mg<sup>2+</sup>
  - ▶ On which of the following component of chloroplast chlorophyll is arranged? Thylakoids
  - ▶ Which of the following impart a red colour to Rose petals? Chromoplast
  - ▶ Which of the following category is most general with its members least resembling with each other than the other categories? Order
  - ▶ Solanum tuberosum is a scientific name of potato
  - ▶ Allium cepa is the scientific name of amaltas
  - ▶ Those organisms which can prepare their own food from simple inorganic material and can store energy are called? Autotrophs
  - ▶ The word which E-Chatton suggested for bacteria and blue green algae was? Pro-cariotique
  - ▶ Organisms of which of the following kingdom have absorptive mode of nutrition? Fungi
  - ▶ Which of the following organisms have Chitin as a major structural component of their cell wall? Fungi
  - ▶ Five kingdom classification was proposed by? Robert Whittaker
  - ▶ Amoeba belongs to which kingdom? Protista
  - ▶ Kingdom Protoctista includes? Fungi
  - ▶ Other name for Kingdom monera is? Prokaryotae
  - ▶ The word virus is derived from Latin word venome meaning? Poisonous Fluid
  - ▶ DNA or RNA of viruses is enclosed in \_\_\_\_\_ coat? Protein
  - ▶ Vaccine Was discovered by? Edward Jenner
  - ▶ The name Bacteriophage was coined by? D Herelle
  - ▶ The size of smallest virus is? 20 nm
  - ▶ The size of poxvirus is? 250 nm
  - ▶ Viruses are \_\_\_\_\_ smaller than bacteria? 10 - 1000 times
  - ▶ We cannot grow viruses in laboratories on artificial medias
  - ▶ Viruses are obligate intracellular parasite.
  - ▶ Viruses are resistant to most of antibiotic treatment
  - ▶ Protein subunits of capsid is called the capsomeres is a characteristic of each virus. Their number in Herpes virus is? 162
  - ▶ Protein coat the capsid of adenovirus is? Surrounding genome
  - ▶ The agent of controversial nature causing mad cow infection is? Prion





- ▶ Men are ten times more likely than women to have what-Colour Blindness
- ▶ What fruit does not ripen after picking- Pineapple
- ▶ What country consumes the most coffee per capita 25 Lb-Finland
- ▶ In the animal kingdom what creatures are in the order—Chiroptera-Bats
- ▶ What would you do with a wandering sailor-Plant it it's a plant
- ▶ The scientist who asserted the earth to be a huge magnet: Ben Franklin
- ▶ Edible part of tomato is whole fruit.
- ▶ Sunlight is composed of seven colours
- ▶ Protein is a natural polymer
- ▶ One micron is equal to One-thousandth of a millimeter.
- ▶ Which cell does not have a nucleus? RBC
- ▶ Drinker's apparatus is for measuring the amount of Alcohol in the blood.
- ▶ Atomic pile is a place where nuclear fission is made.
- ▶ Dewar's flask is called as thermos.
- ▶ Atomic weight of chemical compounds is determined by Mass spectroscopy.
- ▶ Chief food of mosquito larva is micro organism found in water.
- ▶ Chief food of butterfly larva is leaves of plants.
- ▶ Corn adds more oxygen to the atmosphere than it removes.
- ▶ Earthworm is a bi-sexual.
- ▶ Eyes of insects are compound.
- ▶ Silk is obtained from cocoon of silk worm.
- ▶ Clinical thermometer usually measures in Fahrenheit.
- ▶ Tube light emits radiation even after it is disconnected. It is due to Fluorescence.
- ▶ In what organ of the human body do oncocyoma tumors occur? The Kidney
- ▶ AIDS is a Viral Disease
- ▶ The process by which green plants prepare their own food is called photosynthesis
- ▶ Lack of water retards the rate of photosynthesis in plants.
- ▶ What type of cells secrete glucagon? Alpha cells
- ▶ Acupuncture is widely practiced in China
- ▶ The smallest functional and structural unit of kidney is called as Nephron
- ▶ 1 gram of protein is equal to 4 kcals of energy.
- ▶ A protein restricted diet requires only 40-60 grams/day.
- ▶ Which organelles is called 'Atom bombs'? Lysosome
- ▶ Hypertension is the term used for increase in blood pressure
- ▶ 'Palak leaves' are rich in Iron
- ▶ Giant Panda is found in China
- ▶ Quinine is a Forest resource.
- ▶ Loss of memory is caused by the destruction of? Cerebrum
- ▶ Essential constituent of plant cell is which type of carbohydrate? Starch
- ▶ Lowest rate of photosynthesis takes place in Green light



- ▶ Which one is the rootless plant? Eichhornia
- ▶ What is the average adult pulse rate? 72-80
- ▶ Which is widely used as an anesthetic? chloroform
- ▶ Conversion of water into steam is not a chemical action?
- ▶ Sodium nitrate is a fertilizer
- ▶ Burning of candle is a chemical change
- ▶ Which has the same atomic number and atomic weight? Hydrogen
- ▶ Saliva has a pH less than 7
- ▶ Which gas is used in the cigarette lighters? Butane
- ▶ Which gas is the most toxic? Carbon monoxide
- ▶ Which element is found in all organic compounds? Carbon
- ▶ Which element behave chemically both as a metal and a non metal? Boron
- ▶ What is the chemical name of bleaching Powder? Calcium hydrochloride
- ▶ Animal meat is a good source of Protein
- ▶ Milk Sugar is Lactose
- ▶ A man with colour blindness will see red as Green
- ▶ Pasteurization is the process in which milk is heated to  $63^{\circ}\text{C}$  for 30 minutes
- ▶ Which is a major green house gas? Carbon dioxide
- ▶ First successful heart transplantation was done by C.N. Barnard
- ▶ An individual whose blood type is B may in an emergency donate blood to a person whose blood type is AB or B
- ▶ Sandalwood tree is considered a Partial root parasite
- ▶ What is commonly called limestone is  $\text{CaCO}_3$
- ▶ The two elements that exist as liquids at  $25^{\circ}\text{C}$  are bromine and mercury
- ▶ The term 'Carat' is used to express the purity of gold. The purest form of gold is 24 carats
- ▶ The substance that is least prone to catch and spread fire is Cotton
- ▶ The substance that contains the maximum amount of nitrogen is Urea
- ▶ The most commonly used bleaching agent is Chlorine
- ▶ The method that cannot be used for removing permanent hardness of water is Boiling
- ▶ A bee-sting leaves an acid which causes pain and irritation. Which type of this acid? Methanoic acid
- ▶ Human stomach produces acid which helps in digestion of food. Acid is Hydrochloric acid
- ▶ The abnormal constituent of urine is Albumin
- ▶ The element which is required by the plant in large quantity? Nitrogen
- ▶ Which one gives energy to our body? Carbohydrates
- ▶ Whooping cough is a Bacterial Disease
- ▶ Gonorrhoea is a Bacterial Disease
- ▶ A doctor who specializes in the treatment of cancer is called an Oncologist
- ▶ Which cellular characteristic is not thought to contribute to cancer? Programmed cell death
- ▶ What type of cell gives rise to the most tumors? Epithelial
- ▶ Which of the following is not related to excessive alcohol intake? Kidney cancer
- ▶ Diseases caused by the actual contact with the sick person, is called Contagious disease
- ▶ Which one the following is a genetically transmitted disease? Haemophilia
- ▶ Acupuncture is a method of treatment with needles



- ▶ Which of the metals causes Itai-itai disease? Cadmium
- ▶ The liver disease Hepatitis-B is caused by Hepatitis B virus
- ▶ Insects that can transmit diseases to humans are referred to as Vectors
- ▶ Jaundice is a symptom of disease of Liver
- ▶ The procedure of crushing the gallstones and kidney stone by laser is called Lithotripsy
- ▶ When milk is churned, the cream separates from it due to centrifugal force
- ▶ Hepatitis is a disease of Liver
- ▶ The disease that is caused by virus is common cold
- ▶ Disease associated with secretion of toxin is Tetanus
- ▶ Anthrax is a Bacterial Disease
- ▶ Bacterial Meningitis is a Bacterial Disease
- ▶ Botulism is a Bacterial Disease
- ▶ Blastomycosis is a Fungal infectious disease
- ▶ Bronchitis is a disease of which of the following organs? Respiratory tract
- ▶ Which of the following is a viral disease transmitted to man by the bite of rabid animals, particularly dogs? Rabies
- ▶ Which is a fast-spreading disease? Plague
- ▶ Which is a fungal disease? Ringworm
- ▶ Which of the following is the location where fertilization occurs? Fallopian Tubes
- ▶ Which emanation has no mass and no charge? Gamma
- ▶ What anatomical structure connects the stomach and the mouth? Esophagus
- ▶ Cholera disease is water borne
- ▶ The most common disease among poultry in Pakistan is Ranikhet
- ▶ Leukemia is a disease of the Blood
- ▶ Where is our thyroid gland located? Neck region
- ▶ Recording of brain waves from outer surface of head is called E.E.G
- ▶ The force that causes a spring to eventually return to its normal length is called restoring force
- ▶ Echoes are due to reflection of sound waves
- ▶ When the length of a pendulum in a clock is increased, then the period increases and the clock loses time
- ▶ Solder is an alloy of Tin and Lead
- ▶ Where does the hormone cortisol come from? adrenal cortex
- ▶ Which of the following is not secreted by the Pituitary Gland? Calcitonin
- ▶ In plants water is absorbed by the root hairs by a process called Osmosis
- ▶ Development of fruit without fertilization is Parthenocarpy
- ▶ Cell wall of chloroplast is removed, the remaining is called Protoplast
- ▶ Bacteria having flagella all over the body are called Peritrichous
- ▶ Bacteria and fungi developing on dead decaying organisms are Saprophytes
- ▶ The method of concentrating the ore which makes use of the difference in density between ore and impurities is called Levigation
- ▶ The metal that is usually extracted from sea water is Mg
- ▶ The members of a homologous series have same chemical properties
- ▶ Scarlet Fever is a Bacterial Disease
- ▶ Shigellosis is a Bacterial Disease
- ▶ The material that can be permanently deformed by heat and pressure is called a Thermoplastic



- ▶ The major constituent of air is Nitrogen
- ▶ The main use of salt in the diet is to increase the solubility of food particles in water
- ▶ The hardest form of carbon is Diamond
- ▶ Atmospheric nitrogen in soil is fixed by Pulses
- ▶ The normal temperature of the human body is  $98.6^{\circ}\text{F}$
- ▶ An ecosystem has two components namely Biotic and Abiotic
- ▶ All germ cells or reproductive cells divide by the process of Meiosis
- ▶ A simple sequence in which the grass grows, a cow eats the grass, a human eats the cow, or drinks its milk, is an example of a Food chain
- ▶ A cancer that arises from the cells of the skin or the lining cells of the inner organs is named Carcinoma
- ▶ Wisdom teeth normally grow between the age of 17 to 26 years
- ▶ Who are the main producers in an ecosystem? Green Plants
- ▶ Which tissue is responsible for the passage of water in plants? Xylem
- ▶ Which protein occurs abundantly in eggs? Albumin

Biological death of a patient means death of tissues of the brain

The first metal to be used by man was Copper

The development of the ultra microscope makes use of the Tyndall effect

The chief constituent of gobar gas (Bio Gas) is Methane

In which part red blood cells originate? Bone marrow

Vaccines are Treated bacteria or viruses or one of their proteins

Which is the largest living bird? Ostrich

The saliva helps in the digestion of

Starch

- ▶ What endocrine gland is involved in causing Diabetes Insipidus? Pituitary
- ▶ Acromegaly is caused by an excess secretion of which pituitary hormone? Growth Hormone (GH)
- ▶ In what endocrine gland are the Islets of Langerhans located? Pancreas
- ▶ What hormones cause the clinical manifestations of Graves disease? Thyroid hormones
- ▶ What endocrine gland is involved in the clinical condition known as Myxedema? Thyroid
- ▶ Which endocrine gland does NOT stimulate the production of testosterone or actually synthesize the male hormone? Thyroid
- ▶ Which endocrine gland produces melatonin? Pineal gland
- ▶ Lack of what causes diabetes? insulin
- ▶ Kwashiorkor and beri beri are deficiency diseases
- ▶ An infectious disease caused by a spiral shaped bacterium, spread mainly by sexual contact is Syphilis
- ▶ Which of the following diseases is caused by the deficiency of iron in human body? Anemia
- ▶ The color of light which travels through glass with the minimum speed is Yellow
- ▶ Emphysema is a disease caused by environmental pollution in which the affected organ of the body is Lungs
- ▶ An epidemic of infectious diseases which is passed on through population across a large region or worldwide is called Endemic
- ▶ What is the enzyme that is in stomach acid called? Pepsin
- ▶ What group of macromolecules do enzymes belong to? Proteins
- ▶ Which of the following is not one of the salivary glands? Adenoids



- ▶ Which of these does not produce digestive enzymes? Thyroid
- ▶ Vinegar is also known as acetic acid
- ▶ The two bones found in the area between the knee and ankle in humans are known as Fibula and Tibia
- ▶ Which is considered a component of lipids? Fatty acids
- ▶ Blood enters the lungs from which chamber of the heart? Right ventricle
- ▶ Which of the following best describes the biomechanics of breathing? Lever action
- ▶ Animals that eat meat almost exclusively are known as Carnivores
- ▶ Neurons connect together at a Synapse
- ▶ The enzyme, Lipase, is a catalyst for the metabolism of which of these foods? Fats
- ▶ The enzyme, peptidase, is a catalyst for the metabolism of which of these foods? Red meats
- ▶ The enzyme, ptyalin, is a catalyst for the metabolism of which of these food? Starches
- ▶ Which artificially produced digestive enzyme is used in the treatment of patients with cystic fibrosis? Pancreatic peptidase
- ▶ Which of these is not an enzyme, natural or artificial, that is used for medicinal or research purposes? Stomach gastrin
- ▶ The part of an enzyme that is used to break down or construct molecules is known as the active what? Site
- ▶ Which disease is more common among agricultural workers as compared to urban population? Hookworm infection
- ▶ Thalassaemia is a hereditary disease affecting Blood
- ▶ The disease diphtheria affects Throat
- ▶ The most common communicable disease is influenza
- ▶ An anaerobic species of the bacterium Clostridium causes a very serious disease in human populations. Which of the following diseases is it? Botulism
- ▶ Polio is a Viral Disease
- ▶ During sleep a man's blood pressure Fluctuates
- ▶ The function of hemoglobin is to transport oxygen
- ▶ Which part of the human body coordinates the functions of various organs? Brain
- ▶ Which one of the most efficient converter of sunlight? Sugarcane
- ▶ Which is absent in anaerobic bacteria? Cell membrane
- ▶ Which seeds can benefit a patient of diabetes mellitus by normalizing his blood sugar level? Fenugreek seeds
- ▶ The chemical name of table salt is Sodium chloride
- ▶ The chemical name of quartz is Sodium silicate
- ▶ The atomic weight of uranium is 238
- ▶ The acid that can be used as a hypnotic acid is Barbituric Acid
- ▶ The acids generally stored in batteries is Sulphuric Acid
- ▶ Sugars are converted in the liver into Glycogen
- ▶ Sodium Chloride, Potassium Chloride and Magnesium Oxide are examples of molecules with Ionic Bonding
- ▶ What is the silk? Protein
- ▶ Phosgene can be used as a warfare gas
- ▶ Phenol is a raw material used in the manufacture of Bakelite
- ▶ Petroleum is found in Igneous rock
- ▶ Which is used by green plants for the manufacture of sugar? Carbon dioxide, Sun light and Water
- ▶ Bamboo is a Grass



- ▶ Bryophytes are non-vascular plants
- ▶ Ginger is an example of Rhizome
- ▶ Potato is a modified form of stem
- ▶ Which is most important for the growth of children up to the age of 14? Protein
- ▶ The process of formation of blood corpuscles is called Haemopoiesis
- ▶ The process of cell division can take place by Mitosis
- ▶ Permanent hardness of water is due to the presence of Calcium sulphate
- ▶ Passing a battery current through a solution of brine will produce Sodium hydroxide and chlorine
- ▶ Paraffin wax used for making candles is obtained from Petroleum
- ▶ Ozone is? Diamagnetic
- ▶ The one most easily stopped by air are of alpha rays
- ▶ Which is the highest in the Percentage present in the air? Nitrogen
- ▶ Milk contains the sugar Lactose
- ▶ Marsh gas mainly contains  $CH_4$
- ▶ The offspring from a cross between two individuals differing in at least one set of characters is called a Hybrid
- ▶ Which is least effective in photosynthesis? Green light
- ▶ Which is essential for the formation of red blood cells? Folic acid
- ▶ Frog is an amphibian
- ▶ Which is a parasitic plant? Mushroom
- ▶ Rabies is a Viral Disease
- ▶ Whooping cough is caused by Bacillus pertussis
- ▶ Pneumonia is a bacterial disease caused by the type of bacteria called Cocci
- ▶ The dreaded human disease, Syphilis, is caused by a bacterium
- ▶ Which of the following plant diseases is not a bacterial disease? Heart rot of beets
- ▶ Trachoma is a Bacterial Disease
- ▶ Smallpox was named "small" to distinguish it from the "great" pox. Which disease was the "great pox"? Syphilis
- ▶ Which disease is not caused by "bad air" as its name implies but by microscopic animal parasites? malaria
- ▶ Which of the following plant diseases is caused by a virus? Aster yellows, Barley yellow dwarf and Curly top of sugar beets
- ▶ Which describes the shoulder joint? Ball and socket joint
- ▶ A steroid is considered a Lipid
- ▶ Most of the ozone in the atmosphere is concentrated in the stratosphere
- ▶ A Fahrenheit thermometer indicates a temperature of  $-40^{\circ}F$ . Its corresponding reading on the Celsius scale will be  $-40^{\circ}C$
- ▶ Which chamber of the heart pumps blood to the systemic circulation? Left Ventricle
- ▶ What is the meaning of the term 'Myopia'? Short-sighted
- ▶ What do letters CT stand for? Computerized tomography
- ▶ Traditional Chinese Medicine is based on the principles of which religion? Taoism
- ▶ Which is used for its disinfectant properties and is a folk remedy for colds and influenza? Vinegar
- ▶ Which carbohydrate is found mainly in fruits and honey? Fructose
- ▶ What is responsible for diphtheria and influenza? Bacteria and virus respectively
- ▶ When enzymes are heated above a certain temperature, what process do they undergo? Denaturation



- ▶ Which organelle, also known as a suicide bag, is used to break down a cell once it has died? Lysosome
- ▶ Normally, trypsin is produced by which organ? Pancreas
- ▶ Pepsin, a digestive enzyme, is produced in the Stomach
- ▶ The gastric glands in the stomach produce an enzyme? Pepsin
- ▶ Enzymes belong to the category of Proteins
- ▶ Enzymes are sensitive to Heat, pH and Poisons
- ▶ The enzyme that is present in the saliva of man is Amylase
- ▶ Which of the following enzymes converts proteins into peptones? Pepsin
- ▶ Which of the following enzymes converts glucose into ethyl alcohol? Zymase
- ▶ PME is an Enzyme
- ▶ Which one of the following is a viral disease transmitted to man by the bite or rabid animals particularly dogs? Rabies
- ▶ The disease caused by eating fish due to mercury poisoning is called Minamata
- ▶ What is the milk called which is there when a baby is born? Colostrum
- ▶ At what age do babies start to develop (but not show) their teeth? 6 weeks after conception
- ▶ How many 'baby teeth' (primary) teeth do children have? 20
- ▶ How many teeth Adults have? 32
- ▶ Water has maximum density at 4°C
- ▶ What is the chief symptom of the visual disorder known as diplopia? Double vision
- ▶ Where are the hardest working muscles in the human body? In the eyes
- ▶ What was the name of the world's first human test-tube baby? Louise
- ▶ The Intel Pentium bug/ flaw was an issue with the FPU
- ▶ Typically, hard disk drives employ what technology as a storage mechanism? Magnetic
- ▶ What type of device is a computer printer? Output
- ▶ Beats is a result of the phenomenon of interference
- ▶ In a normal situation, what is the recommended method of dealing with a venomous snake bite? Keep the bite lower than the heart and get immediate medical attention.
- ▶ Which of the following can cause a false positive for heroin? Poppy seeds
- ▶ The best method of control of a soil borne disease is by Crop rotation
- ▶ Radioactive cobalt and radium are used for the treatment of disease of Cancer
- ▶ The deficiency of Zinc micronutrient results in little leaf disease:
- ▶ What is coronary heart disease? Where the arteries supplying blood to the heart become narrowed or blocked
- ▶ Flu is caused by a Virus
- ▶ Which metal is the fifth most abundant element in the earth's crust, and is an essential constituent of leaves, shells, bone, and teeth? Calcium
- ▶ Which metal is extensively used with other metals to produce alloys, particularly in die-castings. It is used to "galvanize" metals, to prevent corrosion? Zinc
- ▶ The name "copper" is derived from the name of the tiny island country of Cyprus
- ▶ The Yellow colour of human urine is due to a pigment called Urochrome
- ▶ Sea Horse is a Fish
- ▶ Which one is a mammal? Whale



- ▶ What is the average Female's brain weighs? 45 ounce
- ▶ The average Female's brain weighs 1250 grams (2.8 pounds)
- ▶ What is the average Female's brain weighs? 310 grams
- ▶ "The average adult heart is about the size of a clenched fist and weighs about 11 ounces (310 grams)"
- ▶ Alzheimer's disease is caused partially by which of neurotransmitters? Acetylcholine
- ▶ What is immunity? Immunity is the ability of the body to protect itself from antigens and diseases
- ▶ SARS is a Viral Disease
- ▶ West Nile disease is a Viral Disease
- ▶ Yellow fever is a Viral Disease
- ▶ A digestive enzyme that breaks down starch to maltose? Amylase
- ▶ The pancreas produces enzymes which digest Fats, proteins and Carbohydrates
- ▶ The enzyme salivary amylase begins breaking down this type of food in the mouth? Carbohydrates
- ▶ How many pairs of salivary glands are there? 3
- ▶ The length of an Earth day is determined by the time required for approximately one earth rotation
- ▶ What is the colour of red rose in green light? Black
- ▶ Focusing in a camera is carried out by varying the distance of the lens from the film
- ▶ Bile is produced by Liver
- ▶ Heightened emotion is caused by the Adrenal glands
- ▶ Which human gland does secret growth hormone? Pituitary Gland
- ▶ Which is the smallest gland in human body? Pituitary
- ▶ Which is the largest endocrine gland? Thyroid glands
- ▶ Candidiasis is a Fungal infectious disease
- ▶ What are antibodies made of? Proteins
- ▶ The ingestion of antigens by macrophages can also be known as Opsonization
- ▶ An allergy is? Response from the immune system against antigens
- ▶ Which organ is affected by Sinusitis? Facial bones
- ▶ Haemorrhage is better known as? Bleeding
- ▶ Arterial bleeding is usually the most severe
- ▶ Which is a carnivorous plant? Pitcher plant
- ▶ Which bones is not found in man? Astragalus
- ▶ Which are mostly woody trees, always perennials and never herbs or annuals? Gymnosperms
- ▶ When we eat cauliflower we consume Inflorescence
- ▶ When day-light hours are increased, the rate of photosynthesis Remains unchanged
- ▶ Enamel is a glossy coating fused to the surface of a metal, glass or pottery
- ▶ Elements that show the properties of both metals and non metals are called metalloids
- ▶ During dehydration, the substance that the body usually loses is sodium chloride
- ▶ Distillation the reduced pressure is used for liquids which have Crystalline
- ▶ Carcinogenic chemicals are expected to cause cancer
- ▶ An element found in all organic compounds is Carbon
- ▶ When both sexes are absent from a



- flower or are non-functional, the flower is said to Neuter
- ▶ What should be given to an athlete for instant energy? Carbohydrates
  - ▶ What is the temperature of a normal man?  $37^{\circ}\text{C}$
  - ▶ What is the main purpose of white blood corpuscles? to combat infection
  - ▶ We lose consciousness if the blood flow to the brain is cut off more than 5 seconds
  - ▶ Venom of cobra attacks on Circulatory system
  - ▶ The world's largest flower (Approximately 1 meter in diameter) is Rafflesia
  - ▶ The thickness of human hair is approximately 0.08 mm
  - ▶ The molecules responsible for storing the genetic code are RNA
  - ▶ The metal barium is used in taking x-rays of the alimentary canal
  - ▶ The main difference between the living and nonliving is in the presence of protoplasm
  - ▶ The largest part of most diets are made up of Carbohydrates
  - ▶ The Human cell contains 46 chromosomes
  - ▶ The average heart beat per minute in a normal man is 72
  - ▶ Alloys in which mercury is one of the metals are called Amalgams
  - ▶ Alloy steel containing chromium to resist rusting is known as stainless steel
  - ▶ All pottery ware made from common clay and which are not covered with glaze is called Terracotta
  - ▶ All noble gases are Colourless and Odourless
  - ▶ Alcohol Contains Carbon, hydrogen, oxygen
  - ▶ Air is a Mixture of gases
  - ▶ A chemical used in photography is Sodium thiosulphate
  - ▶ The alimentary canal is usually longer in Herbivores
  - ▶ The 'greenhouse effect' is due to increase in Atmospheric  $\text{CO}_2$  levels
  - ▶ Snakes and lizards are animals that are Cold-blooded
  - ▶ Which lenses are used by people have short sightedness? Concave
  - ▶ Which lenses are used by people have long sightedness? Convex
  - ▶ Tuberculosis is a Bacterial Disease
  - ▶ Scarification of seeds is done for removing? Dormancy
  - ▶ Louis Pasteur was trained as a Chemist
  - ▶ What accessories do you use to change magnification on a telescope? Eyepieces
  - ▶ Mendel made his genetic discoveries using a Garden pea
  - ▶ Who developed the first blood bank and a system for storing blood plasma? Charles Drew
  - ▶ Who invented the first stethoscope? Rene Laennec
  - ▶ Abrasion is a superficial wound
  - ▶ Which of the following is not a contagious disease? Hysteria
  - ▶ Leukemia is a type of cancer in which there is an abnormal increase in the number of white blood cells
  - ▶ Heart attack is caused due to Cholesterol
  - ▶ Milk fever in cow is caused due to the deficiency of Calcium
  - ▶ Antibodies that participate in the defense mechanisms of our body are Hormones
  - ▶ Name the plant hormone that induces cell division is? Kinins
  - ▶ Pituitary gland is located just below the Brain



- ▶ Which of the following glands in human body is popularly called 'Adam's apple'?  
Thyroid
- ▶ The first psychotropic drug was Lithium
- ▶ Acquired Immune-Deficiency Syndrome (AIDS) is caused by Virus
- ▶ "Parkinson" is a disease of Nervous system
- ▶ The outer skin of a cell is called a what?  
Membrane
- ▶ Who invented the artificial kidney dialysis machine? Willem J. Kolff
- ▶ What is the medical term for "fever"?  
Pyrexia
- ▶ Which vital sign is most susceptible to conscious control? Respirations
- ▶ What is another name for Acetylsalicylic Acid? Aspirin
- ▶ Which atomic reactor is used for studies of uranium of heavy water lattice?  
Zerlina
- ▶ Heavy water is  $D_2O$
- ▶ Which of the following is a supporter of combustion? Oxygen gas
- ▶ Choose the source of energy which is different from others? Crude oil
- ▶ Magnetite is a neutral magnet
- ▶ Who proposed the double-helical model of the DNA? Watson, Crick and Franklin
- ▶ The control center of a cell is what?  
Nucleus
- ▶ What are the building blocks of protein molecules called? Amino Acids
- ▶ The structure of DNA was discovered by whom? James Watson and Francis Crick
- ▶ Which is found in plant cell but not animal cell? Cell Wall
- ▶ When a smoker instantaneously quits, what is this action commonly referred to as? Cold turkey
- ▶ The substance known as caffeine is classified with several addictive (and illegal) drugs. Which type of drug is caffeine? Stimulant
- ▶ Mumps is a Viral Disease
- ▶ How many generations of computers have been developed till date? 5
- ▶ Which area of the brain is responsible for control of the body temperature?  
Hypothalamus
- ▶ Rubber is obtained from Latex
- ▶ Pulses are a good source of Proteins
- ▶ First organic chemical to be synthesized in Laboratory is Urea
- ▶ The gas that usually causes explosion in coal mines is Methane
- ▶ Which metal is non toxic in nature?  
Gold
- ▶ Iodine can be separated from a mixture of Iodine and Potassium Chloride by Sublimation
- ▶ The gas used for artificial ripening of green fruit is ethylene
- ▶ The substance used for artificial rain is Silver Iodide
- ▶ Due to rusting the weight of iron Increases
- ▶ Which is a polymer? Vinyl Chloride
- ▶ Biogas mainly contains Methane
- ▶ Why does diamond shine at night?  
Diamond shines because it has tetrahedral molecular structure
- ▶ Plants that grow under average temperature and moisture condition are called mesophytes
- ▶ Plants that grow in saline water are called Halophytes
- ▶ Plants synthesize protein from Amino acids
- ▶ Plants receive their nutrients mainly from soil
- ▶ Plants have Cellulose while animals lack it
- ▶ Plants are killed in winter by frost



- ▶ The proteins are made in the cells under the instructions of Genes
- ▶ Proteins are made of Amino acid
- ▶ Plants absorb most of the water needed by them through their Root hairs
- ▶ Plants absorb dissolved nitrates from soil and convert them into Free nitrogen
- ▶ Pigmentation of skin is due to Melanocytes
- ▶ Photosynthesis takes place faster in White light
- ▶ A light sensitive compound used in photography is silver bromide
- ▶ Of the following which one is not the characteristic of dinoflagellates? Their cells are often covered with shells of interlocking cellulose plates impregnated with calcium
- ▶ Examples of Rhodophytes are Chondrus & Polysiphonia
- ▶ In chlorophytes the main energy stores are Starch
- ▶ Of the following which one is not the characteristic of green algae? Some green algae possess cell wall with cellulose
- ▶ In slime molds spores develop into Swarm cells, Biflagellated cells & amoeboid reproductive cells
- ▶ Spores produced by slime molds are? Haploid
- ▶ Which of the following is responsible for Irish potato famine? Phytophthora infestans
- ▶ How many species of fungi are known till now? 100000
- ▶ Which group represent pathological fungi? Rusts smuts and molds
- ▶ Which one of the following is different from all the rest regarding the number of cells in its body? Yeasts
- ▶ Fungi which get their food directly from dead organic matter are called?

## Decomposers

- ▶ Root like structure in saprotrophic fungi are called? Rhizoids
- ▶ Those fungi which can grow only on their living host and cannot be grown on available defined growth culture medium e.g. various mildews and most rust species are called? Obligate parasitic fungi
- ▶ Oyster mushroom is an example of predator fungi which attack on? Round worms
- ▶ Lichen is a symbiotic mutualistic association of fungi with? Green algae and cyanobacterium
- ▶ Foliose lichen are? Leaf like
- ▶ An association in which fungal hyphae penetrate the outer cells of the plant root forming coils swellings and minute branches and also extend out into surrounding soil is called ectomycorrhizae
- ▶ The Kingdom of recyclers is known as kingdom? Fungi
- ▶ According to two kingdom classification fungi were placed in kingdom? Plantae
- ▶ Ecological role of fungi as decomposers is only paralleled by? Bacteria
- ▶ Coenocytic hyphae are also known as? Aseptate
- ▶ Unicellular fungi which is non-hyphal is? Yeast
- ▶ Parasitic fungi absorb nutrients directly from the living host cytoplasm with the help of special hyphal tips called? Haustoria
- ▶ Constricting ring around nematode is formed by? Arthrobotrys
- ▶ Type of lichen which tightly attaches to rocks is? Crustose
- ▶ Mycorrhizae are found in about \_\_\_\_\_ vascular plants? 95%
- ▶ Spores in sporangia are produced by process? Asexual



- ▶ Simple breaking of mycelium resulting in formation of a new mycelium from each broken segments is called? Fragmentation
- ▶ By which of the following mechanism unicellular yeast reproduce? Budding
- ▶ In which of the following example of fungi dikaryotic hyphae exist for long period? Basidiomycota
- ▶ Which is called black bread mold? Rhizopus
- ▶ At which stage in the life cycle of Rhizopus meiosis takes place? Formation of sporangiophore via germination of zygospore
- ▶ Which one of the following is the largest group of fungi? Ascomycota
- ▶ How many species of ascomycota occur in lichen symbiotic association? 50%
- ▶ All such fungi in which sexual phase has not been observed are present in? Deuteromycota
- ▶ Mode of nutrition in penicillium is? Saprotrophs
- ▶ Penicillium reproduce via? Conidia
- ▶ How many species of mushrooms are edible? 200
- ▶ Death cap/death angel (Amanita) and Jack O Lantern mushroom are examples of? Poisonous mushrooms
- ▶ All plants are eukaryotes
- ▶ Plants are multicellular.
- ▶ Plants are non-motile organisms
- ▶ Bryophytes are called amphibians of plant world because? Bryophytes like amphibian live in damp shady places and close to water body.
- ▶ Hornwarts are included in sub-class? Anthoceropsida
- ▶ Horsetails are included in class? Sphenopsida
- ▶ Antheridia and archegonia are born on \_\_\_\_\_ in bryophytes? Gametophyte
- ▶ In bryophytes fertilization takes place in? Archegonia
- ▶ Antherozoids the male gamete in bryophytes are attracted towards Archegonium i.e. female sex organ by? Chemotactic phenomenon
- ▶ Which of the following of bryophytes are the simplest one? Porella
- ▶ The zygote formed in liverworts is? Unicellular
- ▶ Sporophyte is Diploid
- ▶ Mosses are included in sub-division? Bryopsida
- ▶ Ferns are included in? Pteropsida
- ▶ The simplest of all bryophytes are? Liverworts
- ▶ Antheridiophore and archegoniophore are found in Marchantia & Funaria
- ▶ Protonema is? Algae like
- ▶ Of the following which one is most advanced? Anthoceropsida
- ▶ The part of sporophyte which is called sporangium is Capsule
- ▶ The first cell of the sporophyte generation is Oospore
- ▶ Stem of Psilophyton an example of psilopsida is differentiated into an underground rhizome and an aerial part both of which are \_\_\_\_\_ branched? Dichotomously
- ▶ Which of the following group of tracheophyta has expanded or scale like leaves which are always arranged in whorls? Sphenopsida
- ▶ Which of the following tracheophytes are leafless? Psilopsida
- ▶ Sporangia of which of the following tracheophytes develop singly on the upper side of sporophylls which may or may not be arranged to form strobili.? Lycopsida
- ▶ Gametophyte of Psilopsida develops a symbiotic association with which of the following? Fungus



- ▶ Which of the following is an example of the living member of Psilopsida?
  - ▶ Gymnosperms
- ▶ In term of spore production Selaginella is characterized by Heterosporous
- ▶ Which of the following tracheophytes are also called arthropytes? Sphenopsids
- ▶ Equistem is an example of Sphenopsida
- ▶ Today the land habitat is dominated by Tracheophytes
- ▶ Of the following which one is not the characteristic of the plants included in psilopsida? Rhizoids bear Rhizome
- ▶ Megaphylls are characteristic for Ferns & Seed plants
- ▶ The dichotomously branching system has shape similar to Y
- ▶ The space between the overtopped dichotomous branches was occupied by a sheet of \_\_\_\_\_ cells during evolution of megaphylls? Chlorenchyma
- ▶ Production of two types of spores is known as Heterospory
- ▶ Ground pines are also known as Lycopods & Spike mosses
- ▶ Which of the following plant group first formed true leaves? Lycopsidea
- ▶ The arrangement of unequal dichotomous branches in one plane during evolution of leaves is called Planation
- ▶ Due to which property of Adiantum and example of Filicinae is called Maidenhairfern? Stipe (stalk) and rachis of leaf have black smooth and shiny hair like structures
- ▶ Specialized protective coverings around megasporangium which vary in number are called Integuments
- ▶ In which group of tracheophytes ovules are born on the exposed surface of megasporophylls? Gymnosperms
- ▶ Pinus Taxus and Picea belong to
  - ▶ In life cycle of Pinus megaspores produced by megasporangium divide into 4 megaspores by Meiosis
  - ▶ Microspore of a seed plant that contain male gametophyte including the gamete is called Pollen grain
  - ▶ Monocots are characterized by Number of sepals and petals are 3 or multiple of 3
  - ▶ Maize is an example of Monocot
  - ▶ Aschelminthes is also known as Nematodes
  - ▶ Of the following which one is not included in Proterostomes? Hemichordates
  - ▶ The name animal is derived from the word? Anima
  - ▶ Of the following which one is not the characteristic of Kingdom Animalia? All animals develop from the dissimilar gametes i.e. large sperm and small egg.
  - ▶ The radial symmetry is found in the animals of? Cnidaria
  - ▶ All the animals of the grade radiata are? Diploblastic
  - ▶ Both radial and bilateral symmetry is found in the phylum? Echinodermata
  - ▶ Coelom that develops from the archenteron as outpouching is? Enterocoelom
  - ▶ The animals in which coelom is formed due to splitting of mesoderm are known as Schizocoelous
  - ▶ Of the following which one is not found in series proterostomia? Echinodermata
  - ▶ In some cases the blastomere can produce complete embryo the cleavage will be? Radial and indeterminate
  - ▶ The fate of each blastomere is foretold. The cleavage will be as? Spiral and determinate
  - ▶ Of the following which one is non-



- cellular in most cases in animals?  
Mesenchyme
- ▶ In most triploblasts after embryonic development the three layers are represented as? Structures formed from them
  - ▶ Of the following which one is not the characteristic of triploblasts? All of them have blood vascular system
  - ▶ The system well - developed in the acoelomate is? Excretory system & Nervous system
  - ▶ Pseudocoelom develops from? Blastocoel
  - ▶ The function of coelom is? To provide space for the development of organs and systems
  - ▶ Coelom is lined by Parietal mesoderm & Visceral mesoderm
  - ▶ In acoelomates gut is \_\_\_\_\_ in origin? Endodermal
  - ▶ Sperms are \_\_\_\_\_ in origin? Mesodermal
  - ▶ A sponge of Antarctica which is more than a meter tall is *Scolymastra joubini*
  - ▶ Venus flower basket is also known as *Euplectella*
  - ▶ Inner layers of the sponges are made up of Choanocytes
  - ▶ Porifera range in size from few millimeter wide to more than one meter tall
  - ▶ The internal buds are known as Gemmules
  - ▶ The sponges in which sperms develop first are included in the category of Protandrous
  - ▶ 80% of the food of sponges consists of Detrital organic particles
  - ▶ The skeleton of the sponges is in the form of variously shaped needle like structures called Spicules
  - ▶ The skeleton of sponges is made up of Calcium & Silica
  - ▶ Sperms released in water are carried to the mesenchyme in sponges by Amoeboid cell
  - ▶ Gut in pseudocoelomates is made from Endoderm
  - ▶ In sponges fertilization takes place in Mesenchyme
  - ▶ The single main opening of the sponge cavity is Osculum
  - ▶ Which of the following are motile zooids in cnidarians? Medusae
  - ▶ Exoskeleton of coelenterates terates is made up to Calcium
  - ▶ Excretory system of platyhelminthes consists of Flame cells
  - ▶ Free living example of platyhelminthes is *Dugesia*
  - ▶ Pseudocoelom is character of Aschelminthes
  - ▶ Nervous system of nematods consists of Ventral nerve cord, Dorsal nerve cord & Lateral nerve cord
  - ▶ Which system is present in nematods? Tube - like digestive system
  - ▶ Father of Homeopathy is Heinemann
  - ▶ Pin worm is common name used for *Enterobius vermicularis*
  - ▶ Which of following system is segmentally arranged in annelids? Circulatory system
  - ▶ Marine example of annelid is *Neries*
  - ▶ Annelids are the first group of invertebrates which have developed a closed circulatory system.
  - ▶ The organs of locomotion in annelids are? Setae
  - ▶ Polychaeta have Tentacles, Palps & Eyes
  - ▶ Arthropods are believed to have common origin with annelids.
  - ▶ Main blood vessel of arthropods usually lies on dorsal side
  - ▶ True metamorphosis is not present in



## Arachnida

- ▶ Second largest phylum of invertebrates is Mollusca
- ▶ Mantle in molluscs is present over Dorsal visceral region
- ▶ Body is globular in Sea Urchin
- ▶ Prechordates is another name used for Hemichordates
- ▶ Notochord is present throughout life in Cephalochordates
- ▶ Body is eel like in Cyclostomata
- ▶ Which of the following fishes contained lungs? Dipnoi
- ▶ Shell of egg is leathery in appearance in Reptiles
- ▶ Mammals became dominant in Cenozoic era
- ▶ Which of the following is a chemical link between catabolism and anabolism? ATP
- ▶ Photosynthesis is process in which \_\_\_\_\_ compounds of carbon (CO<sub>2</sub>) and hydrogen (H<sub>2</sub>O) are reduced to carbohydrate like (glucose) using light energy. ? Energy poor
- ▶  $C_6H_{12}O_6 + 6O_2$  is equal to  $6CO_2 + 6H_2O$  + ENERGY represents? Aerobic respiration
- ▶ At which times there is no net gaseous exchange between leaves and the atmosphere? Dawn & Dusk
- ▶ Photosynthesis and respiration occur at same rate. So there is not net exchange of gases between atmosphere and plants.
- ▶ Quantitative study of energy relationships in biological systems obeys? Laws of thermodynamics
- ▶ The organisms able to use sunlight directly as a source of energy are Plants
- ▶ Of the following which one is not an energy releasing process? Photosynthesis
- ▶ Net yield of H<sub>2</sub>O in Photosynthesis is 0 molecule
- ▶ The point at which there is no net exchange of gases between leaves and atmosphere is known as Compensation point
- ▶ Van neil hypothesis about the production of oxygen during phosynthesis was based on the study and investigations on Bacteria
- ▶ Visible light used in photosynthesis ranges from 380 - 750 nm in wavelength
- ▶ Which of the following light is least absorbed by the plants? Green
- ▶ Which of the light is mainly absorbed by the plants? Orange & Red
- ▶ Chlorophyll is insoluble in Water
- ▶ Chlorophyll molecule is a porphyrin ring or tetrapyrrole ring structure
- ▶ Chlorophyll molecule is flat, square and light absorbing
- ▶ Father of Botany is Theophrastus
- ▶ Chlorophyll molecule composed of carbon and nitrogen atoms with Magnesium as central metal ion, which is coordinated with nitrogen.
- ▶ Molecular formula of chlorophyll 'a' molecule is  $C_{55}H_{72}O_5N_4Mg$
- ▶ Which of the following pigment is Blue-green in colour? Chlorophyll a
- ▶ Light reaction takes place on/in? Grana
- ▶ Thylakoids in chloroplasts are stacked into Grana
- ▶ In all plants the major sites of phosynthesis are Leaves respire and utilize O<sub>2</sub> and release CO<sub>2</sub>.
- ▶ The dense fluid filled region in the chloroplast is Stroma
- ▶ Chlorophylls are found embedded in the \_\_\_\_\_ membranes? Thylakoid
- ▶ Xanthophylls are \_\_\_\_\_ pigments? Yellow



- ▶ Chlorophylls mainly absorb \_\_\_\_\_ wavelengths? Orange – red
- ▶ Deficiency of \_\_\_\_\_ causes yellowing in plants? Magnesium
- ▶ The chlorophyll molecule is embedded in the core of thylakoid membrane which acts as? Hydrophobic
- ▶ Father of Medicine is Hippocrates
- ▶ Father of Zoology is Aristotle
- ▶ Which is produced during the formation of photochemical smog? Ozone
- ▶ Regarding the atom of a chemical element, the magnetic quantum number refers to orientation
- ▶ Coal is one of the world's major sources of energy.
- ▶ *Cell for the first time was discovered by Robert Hook.*
- ▶ Theory of mutation was propounded by Hygo de Vries.
- ▶ A theory of acquired character was given by Lamark.
- ▶ Charles Darwin is famous for his theory of struggle for existence and survival of the fittest.
- ▶ 0.200 grams are equal to one carat.
- ▶ Carbon fiber is made by heating textile fibers. These are used in tennis rackets and racing yacht
- ▶ peptide bond b/w amino acids, joined to form proteins, is the linkage b/w N and C
- ▶ An android is any robot that: has the ability to make decisions and formulate plans
- ▶ Which is cause of bird Flue Disease? H5N1
- ▶ What is the staple food of one third of the world's population: Rice
- ▶ What is the most critical thing keeping bananas fresh transport: Temperature not below 13 C 55F
- ▶ For what is spirits of salt another name?
- Hydrochloric acid
- ▶ What is the only creature that can turn its stomach inside out? Starfish
- ▶ What is the world's most popular green vegetable? Lettuce
- ▶ Which acid was first prepared from distilled red ants? Formic acid
- ▶ Which fruit contains the most protein? Avocado
- ▶ Hygrometer measures humidity in atmosphere
- ▶ First human heart transplant operation conducted by Dr. Christian Bernard on Louis Washkansky, was conducted in 1967
- ▶ Ecology deals with Relation between organisms and their environment
- ▶ Who discovered penicillin? Alexander Fleming.
- ▶ Water vapours are formed due to evaporation
- ▶ During the winter months 90% of fallen leaves are taken underground by earth worm
- ▶ Organisms are classified into three Domains and into one of six Kingdoms of life. These Kingdoms are Archaeobacteria, Eubacteria, Protista, Fungi, Plantae, and Animalia.
- ▶ Organisms are placed into these categories based on similarities or common characteristics.
- ▶ Archaeobacteria single-celled prokaryotes were originally thought to be bacteria.
- ▶ Archaeobacteria are in the Archaea Domain and have a unique ribosomal RNA type.
- ▶ The cell wall composition of Archaeobacteria extreme organisms allows them to live in some very inhospitable places, such as hot springs and hydrothermal vents.
- ▶ Eubacteria organisms are considered to be true bacteria and are classified



under the Bacteria Domain. While most bacteria do not cause disease, others can cause serious illnesses.

- ▶ Bacteria reproduce at an alarming rate under the right conditions. Most reproduce by binary fission.
- ▶ Protista Kingdom includes a very diverse group of organisms.
- ▶ Some have characteristics of animals (protozoa), while others resemble plants (algae) or fungi (slime molds). These eukaryotic organisms have a nucleus that is enclosed within a membrane.
- ▶ Fungi include both unicellular (yeast and molds) and multicellular (mushrooms) organisms. Fungi are decomposers and acquire nutrients through absorption.
- ▶ Plants are extremely important to all life on earth as they provide oxygen, shelter, clothing, food, and medicine for other living organisms.
- ▶ Animalia Kingdom includes animal organisms. These multicellular eukaryotes depend on plants and other organisms for nutrition.
- ▶ Most animals live in aquatic environments and range in size from tiny tardigrades to the extremely large blue whale.
- ▶ Taxonomy is a hierarchical system for classifying and identifying organisms.
- ▶ Taxonomy system was developed by Swedish scientist Carolus Linnaeus in the 18th century.
- ▶ Linnaeus's taxonomy system has two main features that contribute to its ease of use in naming and grouping organisms. The first is the use of binomial nomenclature.
- ▶ The scientific name for humans is *Homo sapiens*. The genus name is *Homo* and the species is *sapiens*.
- ▶ The second feature of Linnaeus's taxonomy system that simplifies organism classification is the ordering

of species into broad categories.

- ▶ The major categories of taxonomy include: Kingdom, Phylum, Class, Order, Family, Genus, and Species.
- ▶ Categories have been updated to include Domain in the taxonomic hierarchy.
- ▶ Domain is the broadest category and organisms are grouped primarily according to differences in ribosomal RNA structure.
- ▶ Taxonomic categories can be further divided into intermediate categories such as subphyla, suborders, superfamilies, and superclasses.
- ▶ Aquatic communities are the world's major water habitats.
- ▶ Like land biomes, aquatic communities can also be subdivided based on common characteristics. Two common designations are: freshwater and marine communities.
- ▶ Estuaries are feeding and breeding grounds for a variety of animals, including: waterfowl, reptiles, mammals, and amphibians.
- ▶ Oceans cover approximately 70% of the earth's surface.
- ▶ Marine communities are difficult to divide into distinct types, but can be classified based on the degree of light penetration.
- ▶ The simplest classification of Marine consists of two distinct zones: the photic and aphotic zones.
- ▶ The photic zone is the light zone or area from the surface of the water to the depths at which the light intensity is only around 1 percent of that at the surface. Photosynthesis occurs in this zone.
- ▶ The vast majority of marine life exists in the photic zone.
- ▶ The aphotic zone is an area that receives little or no sunlight. The environment in this zone is extremely



dark and cold.

- ▶ Organisms living in the aphotic zone are often bioluminescent or are extremophiles and adept at living in extreme environments.
- ▶ Biomes are the world's major habitats. These habitats are identified by the vegetation and animals that populate them. The location of each land biome is determined by the regional climate.
- ▶ Tropical rain forests are characterized by dense vegetation, seasonally warm temperatures, and abundant rainfall.
- ▶ The animals that dwell here depend on trees for housing and food. Some examples are monkeys, bats, frogs, and insects.
- ▶ Savannas are open grasslands with very few trees. There's not much rain, so the climate is mostly dry. Inhabitants include lions, elephants, zebras, and antelope.
- ▶ Deserts are typically dry areas that experience extremely small amounts of rainfall. They can be either cold or hot.
- ▶ Chaparrals, found in coastline regions, are characterized by dense shrubs and grasses.
- ▶ Temperate grasslands are located in cold regions and are similar to savannas in terms of vegetation. Animals populating these areas include bison, zebras, gazelles, and lions.
- ▶ Temperate forests have high levels of rainfall and humidity. Trees, plants, and shrubs grow in the spring and summer seasons, then become dormant in winter. Wolves, birds, squirrels, and foxes are examples of animals that live here.
- ▶ Taigas are forests of dense evergreen trees. The climate in these areas is generally cold with plenty of snowfall. Animals found here include beavers, grizzly bears, and wolverines.
- ▶ Tundra biomes are characterized by

extremely cold temperatures and treeless, frozen landscapes. The vegetation consists of short shrubs and grasses. Animals of this area are musk oxen, lemmings, reindeer, and caribou.

- ▶ The animals and organisms in a biome have adapted to live in that particular ecosystem.
- ▶ Deserts are dry areas that experience extremely small amounts of rainfall. They can be either cold or hot.
- ▶ Deserts are determined by low amounts of rainfall, not temperature. They typically receive less than 30 cm of rain per year. The driest deserts often receive less than 2 cm of rain per year.
- ▶ Tropical rain forests are characterized by dense vegetation, seasonally warm temperatures, and abundant rainfall. The animals that dwell here depend on trees for housing and food.
- ▶ Tropical rain forests are very hot and wet. They can average between 6 and 30 feet of precipitation per year. The average temperature is fairly constant ranging from about 77 to 88 degrees Fahrenheit.
- ▶ Tropical rain forests are typically located in areas of the world that are near the equator.
- ▶ A great variety of plants can be found in tropical rain forests.
- ▶ Some examples of rain forest plants include: kapok trees, palm trees, strangler fig trees, banana trees, orange trees, ferns, and orchids.
- ▶ Tropical rain forests are home to the majority of plant and animal species in the world. Wildlife in the tropical rain forest is very diverse.
- ▶ Animals include a variety of mammals, birds, reptiles, amphibians and insects. Examples are: monkeys, gorillas, jaguars, anteaters, lemurs, snakes, bats, frogs, butterflies, and ants.
- ▶ Rain forest creatures have



characteristics such as bright colors, distinctive markings, and grasping appendages.

- ▶ These traits help the animals adapt to life in the rain forest.
- ▶ The savanna biome consists of areas of open grassland with very few trees. There are two types of savannas, tropical and semi-tropical savannas. A savanna is one type of grassland biome.
- ▶ The savanna climate varies according to the season. In the dry season temperatures can be either extremely hot or cool.
- ▶ Savannas are typically dry receiving less than 30 inches of rain on average per year.
- ▶ Tropical savannas may receive as much as 50 inches of rain in the wet season, but as little as 4 inches during the dry season.
- ▶ Grasslands are located on every continent with the exception of Antarctica.
- ▶ Some locations of savannas include: Africa - Kenya, Tanzania, Zimbabwe, Botswana, South Africa, and Namibia
- ▶ The savanna biome is often described as an area of grassland with dispersed singular or clusters of trees.
- ▶ The lack of water makes savannas a difficult place for tall plants, such as trees, to grow.
- ▶ Savannas are home to many large land mammals including elephants, giraffes, zebras, rhinoceros, buffalo, lions, leopards and cheetahs.
- ▶ Temperate grasslands and savannas are two types of grassland biomes.
- ▶ Like savannas, temperate grasslands are areas of open grassland with very few trees.
- ▶ Temperate grasslands, however are located in colder climate regions and receive less precipitation on average

than savannas.

- ▶ Temperatures in temperate grasslands vary according to the season. In winter, temperatures can plummet to well below 0 degrees Fahrenheit in some areas. In summer, temperatures can reach above 90 degrees Fahrenheit.
- ▶ Temperate grasslands receive low to moderate precipitation on average per year (20-35 inches). Most of this precipitation is in the form of snow in temperate grasslands of the northern hemisphere.
- ▶ Grasslands are located on every continent with the exception of Antarctica.
- ▶ Some locations of temperate grasslands include:
  - ▶ Grasslands of Argentina are pampas
  - ▶ Grasslands of Australia are downs
  - ▶ Grasslands of Central North America are plains and prairies
  - ▶ Grasslands of Hungary are puszta
  - ▶ Grasslands of New Zealand are downs
  - ▶ Grasslands of Russia are steppes
  - ▶ Grasslands of South Africa are veldts
- ▶ Low to moderate precipitation makes temperate grasslands a difficult place for tall plants such as woody shrubs and trees to grow.
- ▶ Temperate grassland vegetation can either be short or tall. In areas that receive little precipitation, grasses remain low to the ground.
- ▶ Temperate forests are areas with high levels of precipitation, humidity and contain a variety of deciduous trees. Deciduous trees lose their leaves in winter.
- ▶ Temperate forests have a wide range of temperatures that correlate with the distinctive seasons. Temperatures range from hot in the summer with highs of 86 degrees Fahrenheit, to



extremely cold in the winter with lows of - 22 degrees Fahrenheit.

- ▶ Temperate forests receive abundant amounts of precipitation, usually between 20-60 inches of precipitation annually. This precipitation is in the form of rain and snow.
- ▶ Temperate forest animals have many different ways to deal with the cold and lack of food in winter.
- ▶ The tundra biome is characterized by extremely cold temperatures and treeless, frozen landscapes. There are two types of tundra, the arctic tundra and the alpine tundra.
- ▶ The arctic tundra is located between the north pole and the coniferous forests or taiga region. It is characterized by extremely cold temperatures and land that remains frozen year-round.
- ▶ Alpine tundra occurs in frigid mountaintop regions at very high elevations.
- ▶ Alpine tundra can be found in high elevations anywhere in the world, even in tropic regions.
- ▶ The arctic tundra is located in the extreme northern hemisphere around the north pole.
- ▶ The arctic tundra typically receives less than 10 inches of precipitation per year (mostly in the form of snow) with temperatures averaging below minus 30 degrees Fahrenheit in winter.
- ▶ The alpine tundra biome is also a cold climate region with temperatures averaging below freezing at night.
- ▶ Taigas, also called boreal forests or coniferous forests, are forests of dense evergreen trees that extend across North America, Europe, and Asia.
- ▶ Taigas are the world's largest land biome.
- ▶ The climate in the taiga biome is extremely cold.
- ▶ Taiga winters are long and harsh with temperatures averaging below freezing.
- ▶ Taiga summers are short and cool with temperatures ranging between 20-70 degrees Fahrenheit.
- ▶ The annual precipitation in Taiga region is usually between 15-30 inches, mostly in the form of snow.
- ▶ Some locations of taigas include: Alaska, Central Canada, Europe, and Siberia
- ▶ Due to cold temperatures and slow organic decomposition, taigas have thin, acidic soil. Coniferous, needle-leaf trees abound in the taiga.
- ▶ Chaparrals are dry areas typically found in coastline regions. The landscape is predominated by dense evergreen shrubs and grasses.
- ▶ Chaparrals are mostly hot and dry in the summer and rainy in the winter, with temperatures ranging from about 30-100 degrees Fahrenheit.
- ▶ Chaparrals are home to many burrowing animals. These animals include ground squirrels, jack rabbits, gophers, skunks, toads, lizards, snakes, and mice.
- ▶ The forebrain is the division of the brain that is responsible for a variety of functions including receiving and processing sensory information, thinking, perceiving, producing and understanding language, and controlling motor function.
- ▶ There are two major divisions of forebrain: the diencephalon and the telencephalon.
- ▶ The diencephalon contains structures such as the thalamus and hypothalamus which are responsible for such functions as motor control, relaying sensory information, and controlling autonomic functions.
- ▶ The telencephalon contains the largest part of the brain, the cerebrum.



are longer and less numerous (usually only one or two) they are termed flagella.

- ▶ Typically cilia and flagella have a core composed of microtubules connected to the plasma membrane arranged in what is known as a 9 + 2 pattern.
- ▶ Both cilia and flagella are found in numerous types of cells.
- ▶ The Golgi apparatus is the "manufacturing and shipping center" of a eukaryotic cell.
- ▶ The Golgi apparatus, sometimes called the Golgi complex or Golgi body, is responsible for manufacturing, warehousing, and shipping certain cellular products, particularly those from the endoplasmic reticulum (ER).
- ▶ Cells that specialize in secreting various substances typically have a high number of Golgi.
- ▶ A Golgi apparatus is composed of flat sacs known as cisternae.
- ▶ The sacs are stacked in a bent, semicircular shape. Each stacked grouping has a membrane that separates its insides from the cell's cytoplasm.
- ▶ Molecules synthesized in the ER exit via special transport vesicles which carry their contents to the Golgi apparatus.
- ▶ The vesicles fuse with Golgi cisternae releasing their contents into the internal portion of membrane.
- ▶ The molecules are modified as they are transported between cisternae layers. It is thought that individual sacs are not directly connected, thus the molecules move between cisternae through a sequence of budding, vesicle formation, and fusion with the next Golgi sac.
- ▶ The Golgi apparatus modifies many products from the ER including proteins and phospholipids.
- ▶ The Golgi apparatus or Golgi complex

is capable of dis-assembly and reassembly.

- ▶ The Golgi apparatus is only one component of a cell.
- ▶ The "power houses" of a eukaryotic cell are mitochondria.
- ▶ Mitochondria organelles generate power by converting energy into forms that are usable by the cell.
- ▶ Mitochondria located in the cytoplasm
- ▶ Mitochondria are the sites of cellular respiration. Cellular respiration is a process that ultimately generates fuel for the cell's activities.
- ▶ Mitochondria are also involved in other cell processes, such as cell division, growth, and cell death.
- ▶ Mitochondria have a distinctive oblong or oval shape and are bounded by a double membrane.
- ▶ Mitochondria are found in both animal and plant cells. The number of mitochondria within a cell varies depending on the type and function of the cell.
- ▶ Some cells, such as mature red blood cells, do not contain mitochondria at all.
- ▶ Mitochondria have their own DNA, ribosomes and can make their own proteins.
- ▶ Mitochondrial DNA (mtDNA) encodes for proteins that are involved in electron transport and oxidative phosphorylation, which occur in cellular respiration.
- ▶ In oxidative phosphorylation, energy in the form of ATP is generated within the mitochondrial matrix.
- ▶ Proteins synthesized from mtDNA also encode for the production of the RNA molecules transfer RNA and ribosomal RNA.
- ▶ Mitochondrial DNA differs from DNA found in the cell nucleus in that it does not possess the DNA repair



- mechanisms that help prevent mutations in nuclear DNA.
- ▶ Mitochondria are bounded by a double membrane. Each of these membranes is a phospholipid bilayer with embedded proteins.
- ▶ The intermembrane space is the narrow part between the two membranes, while the mitochondrial matrix is the part enclosed by the innermost membrane.
- ▶ Mitosis is a form of cell division that enables organisms to grow and reproduce.
- ▶ The mitosis stage of the cell cycle involves the separation of nuclear chromosomes, followed by cytokinesis (division of the cytoplasm forming two distinct cells).
- ▶ At the end of mitosis, two distinct daughter cells are produced. Each cell contains identical genetic material.
- ▶ Anaphase is a stage in mitosis where chromosomes begin moving to opposite ends (poles) of the cell.
- ▶ Allele is an alternative form of a gene (one member of a pair) that is located at a specific position on a specific chromosome.
- ▶ Asters are radial microtubule arrays found in animal cells that help to manipulate chromosomes during cell division.
- ▶ Cell Cycle is the life cycle of a dividing cell. It includes Interphase and the M phase or Mitotic phase (mitosis and cytokinesis).
- ▶ Centrioles are cylindrical structures that are composed of groupings of microtubules arranged in a 9 + 3 pattern.
- ▶ Centromere is a region on a chromosome that joins two sister chromatids.
- ▶ Chromatid is a one of two identical copies of a replicated chromosome.
- ▶ Chromatin is a mass of genetic material composed of DNA and proteins that condense to form chromosomes during eukaryotic cell division.
- ▶ Chromosome is a long, stringy aggregate of genes that carries heredity information (DNA) and is formed from condensed chromatin.
- ▶ Cytokinesis is a division of the cytoplasm that produces distinct daughter cells.
- ▶ Cytoskeleton is a network of fibers throughout the cell's cytoplasm that helps the cell maintain its shape and gives support to the cell.
- ▶ Diploid Cell is a cell that contains two sets of chromosomes. One set of chromosomes is donated from each parent.
- ▶ Genes are segments of DNA located on chromosomes that exist in alternative forms called alleles.
- ▶ Haploid Cell is a cell that contains one complete set of chromosomes.
- ▶ Kinetochore is a specialized region on the centromere of chromosome where spindle polar fibers attach to the chromosome.
- ▶ Kinetochore Fibers is microtubules that connect kinetochores to spindle polar fibers.
- ▶ Interphase is a stage in the cell cycle where a cell doubles in size and synthesizes DNA in preparation for cell division.
- ▶ Metaphase is a stage in mitosis where chromosomes align along the metaphase plate in the center of the cell.
- ▶ Mitosis is a a phase of the cell cycle that involves the separation of nuclear chromosomes followed by cytokinesis.
- ▶ Nucleus is a membrane bound structure that contains the cell's hereditary information and controls the cell's growth and reproduction.



- ▶ Polar Fibers are the spindle fibers that extend from the two poles of a dividing cell.
- ▶ Prophase is a stage in mitosis where chromatin condenses into discrete chromosomes.
- ▶ Sister Chromatids is two identical copies of a single chromosome that are connected by a centromere.
- ▶ Spindle Fibers aggregates of microtubules that move chromosomes during cell division.
- ▶ Telophase is a stage in mitosis where the nucleus of one cell is divided equally into two nuclei.
- ▶ Biological Evolution is any genetic change in a population that is passed on from one generation to the next.
- ▶ Chromosome is a strand of genes formed from condensed chromatin.
- ▶ Chromosome Mutation is a change in the number or structure of chromosomes in a cell.
- ▶ Dihybrid Cross is a genetic inheritance cross between individuals that differ in two traits.
- ▶ DNA is a nucleic acid that contains the genetic information necessary for the reproduction of life.
- ▶ DNA Transcription is a process involving the transcribing of genetic information from DNA to RNA in protein synthesis.
- ▶ F1 generation is a first filial generation resulting from the cross of parental generation organisms.
- ▶ F2 generation is a second filial generation resulting from the cross of F1 generation individuals.
- ▶ Gametes are the haploid reproductive cells that unite during sexual reproduction to form a diploid zygote.
- ▶ Genetic Recombination is a recombining of genes to produce organisms with new gene combinations.
- ▶ The change of genes within a population that produces favorable traits, which are passed on to the population as a whole is called Genetic Variation.
- ▶ Genotype is an organism's genetic composition.
- ▶ True-breeding is an organism that only produces offspring with the same phenotypic traits.
- ▶ Pollen is the fertilization agent of plants and the essential element for the survival of many plant species.
- ▶ Pollen is responsible for the formation of seeds, fruit, and those pesky allergy symptoms. Discover 10 facts about pollen that may surprise you.
- ▶ Though we associate pollen with the color yellow, pollen can come in many vibrant colors, including red, purple, white, and brown.
- ▶ Pollen is an allergen and the culprit behind some allergic reactions. Microscopic pollen grains that carry a certain type of protein are typically the cause of allergic reactions.
- ▶ Plants often employ tricks to lure pollinators into collecting pollen. Flowers that have white or other light colors are more easily seen in the dark by nocturnal insects like moths.
- ▶ Pollen contains the male sex cells in plants.
- ▶ Pollen is the male sperm producing gametophyte of a plant. A pollen grain contains both non-reproductive cells, known as vegetative cells, and a reproductive or generative cell.
- ▶ In flowering plants, pollen is produced in the anther of the flower stamen. In conifers, pollen is produced in the pollen cone.
- ▶ Pollen grains must create a tunnel for pollination to occur.
- ▶ Pollen is required for both self pollination and cross pollination.



- ▶ Some plants use toxins to prevent self pollination.
- ▶ Pollen refers to powdery spores.
- ▶ Pollen is a botanical term used as long ago as 1760 by Carolus Linnaeus, the inventor of the binomial nomenclature system of classification.
- ▶ The term pollen referred to "the fertilizing element of flowers." Pollen has come to be known as "fine, powdery, yellowish grains or spores."
- ▶ Photosynthesis occurs in eukaryotic cell structures called chloroplasts.
- ▶ A chloroplast is a type of plant cell organelle known as a plastid. Plastids assist in storing and harvesting needed substances for energy production.
- ▶ A chloroplast contains a green pigment called chlorophyll, which absorbs light energy for photosynthesis.
- ▶ The name chloroplast indicates that these structures are chlorophyll containing plastids.
- ▶ Like mitochondria, chloroplasts have their own DNA, are responsible for energy production, and reproduce independently from the rest of the cell through a division process similar to bacterial binary fission.
- ▶ Chloroplasts are also responsible for producing amino acids and lipid components needed for chloroplast membrane production.
- ▶ Chloroplasts can also be found in other photosynthetic organisms such as algae.
- ▶ Plant chloroplasts develop mainly in cells located in plant leaves.
- ▶ Chloroplasts and other plastids develop from cells called proplastids.
- ▶ Proplastids are immature, undifferentiated cells that develop into different types of plastids.
- ▶ A proplastid that develops into a chloroplast, only does so in the presence of light.
- ▶ Chloroplasts contain several different structures, each having specialized functions.
- ▶ Thylakoid Membrane is internal membrane system consisting of flattened sac-like membrane structures called thylakoids that serve as the sites of conversion of light energy to chemical energy.
- ▶ Grana (singular granum) is a dense layered stacks of thylakoid sacs that serve as the sites of conversion of light energy to chemical energy.
- ▶ Stroma is a dense fluid within the chloroplast that lies inside the envelope but outside the thylakoid membrane. This is the site of conversion of carbon dioxide to carbohydrates (sugar).
- ▶ Chlorophyll is a green photosynthetic pigment within the chloroplast grana that absorbs light energy.
- ▶ In photosynthesis, the sun's solar energy is converted to chemical energy.
- ▶ The chemical energy is stored in the form of glucose (sugar). Carbon dioxide, water, and sunlight are used to produce glucose, oxygen, and water. Photosynthesis occurs in two stages.
- ▶ The cell wall is the rigid, semi-permeable protective layer in some cell types.
- ▶ In plants, the cell wall is composed mainly of strong fibers of the carbohydrate polymer cellulose.
- ▶ Cellulose is the major component of cotton fiber and wood and is used in paper production.
- ▶ The plant cell wall is multi-layered and consists of up to three sections. From the outermost layer of the cell wall, these layers are identified as the middle lamella, primary cell wall, and secondary cell wall.

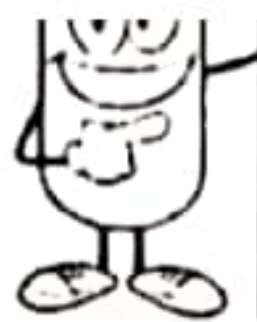


- ▶ While all plant cells have a middle lamella and primary cell wall, not all have a secondary cell wall.
- ▶ Middle lamella is a outer cell wall layer that contains polysaccharides called pectins. Pectins aid in cell adhesion by helping the cell walls of adjacent cells to bind to one another.
- ▶ Nucleolus is a structure within the nucleus that helps in the synthesis of ribosomes.
- ▶ Nucleopore is a tiny hole within the nuclear membrane that allows nucleic acids and proteins to move into and out of the nucleus.
- ▶ Peroxisomes are tiny structures bound by a single membrane that contain enzymes that produce hydrogen peroxide as a by-product.
- ▶ Plasmodesmata pores or channels between plant cell walls that allow molecules and communication signals to pass between individual plant cells.
- ▶ Vacuole is a typically large structure in a plant cell that provides support and participates in a variety of cellular functions including storage, detoxification, protection, and growth.
- ▶ In photosynthesis, solar energy is converted to chemical energy. The chemical energy is stored in the form of glucose (sugar). Carbon dioxide, water, and sunlight are used to produce glucose, oxygen, and water. The chemical equation for this process is:  $6\text{CO}_2 + 12\text{H}_2\text{O} + \text{light} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 + 6\text{H}_2\text{O}$
- ▶ Six molecules of carbon dioxide ( $6\text{CO}_2$ ) and twelve molecules of water ( $12\text{H}_2\text{O}$ ) are consumed in the process, while glucose ( $\text{C}_6\text{H}_{12}\text{O}_6$ ), six molecules of oxygen ( $6\text{O}_2$ ), and six molecules of water ( $6\text{H}_2\text{O}$ ) are produced. This equation may be

simplified as:  $6\text{CO}_2 + 6\text{H}_2\text{O} + \text{light} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$

- ▶ Outer and inner protective coverings membranes: chloroplast structures enclosed. that keep
- ▶ Stroma: dense fluid within the chloroplast. Site of conversion of carbon dioxide to sugar.
- ▶ Thylakoid: flattened membrane structures. sac-like Site of conversion of light energy to chemical energy.
- ▶ Grana: dense layered stacks of thylakoid sacs. Sites of conversion of light energy to chemical energy.
- ▶ Chlorophyll: a green pigment within the chloroplast. Absorbs light energy.
- ▶ Photosynthesis occurs in two stages. These stages are called the light reactions and the dark reactions.
- ▶ The light reactions take place in the presence of light. The dark reactions do not require direct light, however dark reactions in most plants occur during the day.
- ▶ In summary, photosynthesis is a process in which light energy is converted to chemical energy and used to produce organic compounds.
- ▶ In plants, photosynthesis typically occurs within the chloroplasts located in plant leaves. Photosynthesis consists of two stages, the light reactions and the dark reactions.
- ▶ The light reactions convert light into energy (ATP and NADHP) and the dark reactions use the energy and carbon dioxide to produce sugar.
- ▶ Plant leaves help to sustain life on earth as they generate food for both plant and animal life.





- ▶ Linseed oil is used while oil painting.
- ▶ Smell is the weakest sense in Birds.
- ▶ Owl can rotate his head to 180 degrees on either sides.
- ▶ Ostrich eat pebbles for helping digestion by grinding up the ingested food.
- ▶ The cuckoo sneaks its eggs into other birds' nest to hatch.
- ▶ Birds are warm blooded animals.
- ▶ Birds bones are hollow.
- ▶ Which dictator preferred 50,000 rifles to 50,000 votes-Benito Mussolini
- ▶ What country was once named New France- Canada
- ▶ In which country were modern banknotes first used-Sweden
- ▶ Oven birds build strong nests.
- ▶ Weaver birds are called to the birds who build their nests.
- ▶ Male birds are more colorful than females.
- ▶ Birds do not fly are penguins, emus, kiwis, ostriches.
- ▶ Aircraft designers test their model of aircraft in with tunnel.
- ▶ Flaps are used as air brakes.
- ▶ Amphibians were the first vertebrate.
- ▶ With which organ does a snake hear? Tongue
- ▶ If you had variola what disease have you got? Smallpox
- ▶ The first Muslim scientist who presented the law of reflection and refraction is Ibn-ul-Haitham.
- ▶ Basic component of paper is wood.
- ▶ Density of water is 1
- ▶ Water expands as it freezes to ice. This makes ice less dense than water which causes ice to float.
- ▶ Heat flows in three ways conduction, convection and radiation
- ▶ A concave lens is used for the correction of the Hyperphobia
- ▶ Color with shortest wavelength is Blue
- ▶ Least deviated color in prism is red
- ▶ What herb would you use for bronchitis? Tea
- ▶ What does feverfew help? Migraines
- ▶ What herb is said to help with vomiting? Oregano
- ▶ What herb would I use if wanted to enhance the effect of aspirin? Coffee
- ▶ What herb is said to help regulate your Blood Pressure? Celery Seed
- ▶ What herb is helpful in water retention? Juniper
- ▶ To find the hidden secrets under the water, the ships and submarines use which system? Sonar system
- ▶ This herb may help reduce a fever? Oregano
- ▶ What is a computer virus? Software program
- ▶ IC Chips used in computers are usually made of Silicon
- ▶ Citronella is often used as what? insect repellent
- ▶ Which herb is a powerful sedative and should be used very carefully? Valerian



- ▶ Disease beri beri is because of use of milled rice
- ▶ Primarily, which one of the following systems of the body is attacked by the HIV? Immune
- ▶ The improper function of which of the following results in condition 'Myxedema' in human beings? Thyroid gland
- ▶ ECG is used for the diagnosis of ailment of the Heart
- ▶ Our Skin becomes dark, when exposed to excess sunlight. This is because of our skin pigment called Melanin
- ▶  $O_2$  released in the process of photosynthesis comes from Water
- ▶ Number of chromosomes in Down's syndrome is 47
- ▶ Normal adult human male has 14 gm of hemoglobin/100 gm of blood
- ▶  $N_2$  content is kept constant in the biosphere due to Nitrogen cycle
- ▶ Which of the primary component of natural gas? Methane
- ▶ Myopia is connected with the eyes
- ▶ Movements in plants due to light are shown by flowering plants
- ▶ Man in the life cycle of plasmodium is Secondary host
- ▶ Man belongs to the phylum? chordata
- ▶ Mammals are Warm-blooded
- ▶ Male frogs show vocal sacs and Nuptial pads
- ▶ Maize grain is a seed
- ▶ Which is the formula for baking soda?  $NaHCO_3$
- ▶ What colour flame does Lithium have when it is lit? Crimson
- ▶ What is the main component of biogas and natural gas? Methane
- ▶ Which of these has the highest calorific value? Hydrogen
- ▶ Coal is formed due to the process of Carbonization
- ▶ Which variety of coal contains the highest percentage of carbon? Anthracite
- ▶ What is the main constituent of coal gas?  $CH_4$
- ▶ Age of a tree can be determined by Counting the number of rings in the stem
- ▶ The outermost layer of skin is known as Epidermis
- ▶ The protoplasm of a child is exactly the same as that of its Identical twin
- ▶ Which is a physical basis of life? Protoplasm
- ▶ The thin layer that forms a common layer for any two adjacent cells is Middle lamella
- ▶ Antibodies are Proteins
- ▶ Interferon is Virus
- ▶ A person having AB-group of blood to donate a person having AB-group
- ▶ How many types of white blood cells do we have? 5
- ▶ Which of these are parts of your immune system? Lymphocytes
- ▶ How many cranial nerves are there in the human brain? 12
- ▶ Redness in blood is because of the presence of iron in haeme pigment
- ▶ Number calls in human body are? 75 trillion
- ▶ What is the average Male's brain weighs? 48 ounce
- ▶ The average Male's brain weighs 1360 grams (3 pounds)
- ▶ Lungs are situated in the Thoracic cavity
- ▶ Lungs are enclosed in Pleural membrane
- ▶ Lock jaw, that is, difficulty in opening the mouth is a symptom of Tetanus



- ▶ Lion is kept under in Etolian pyramid as Secondary Consumer
- ▶ Lichen is considered to be a symbiotic association of two living organisms. Which organisms are involved in it? Algae and fungi
- ▶ Which allotrope of phosphorus is the most stable? Black
- ▶ Which metal has the lowest vapor pressure and the highest melting point? Tungsten
- ▶ Which is used in making bullet-proof jackets? Boron carbide
- ▶ Which element shows maximum radioactivity? Radium
- ▶ Which is the rarest naturally-occurring element on Earth? astatine
- ▶ Which change occurs when a photographic film is exposed to light? The reduction of a silver salt to metallic silver
- ▶ Which reacts with water to form a soluble compound and an insoluble gas? Potassium
- ▶ Which metal has an oxide that cannot be reduced by heating with magnesium? Calcium
- ▶ Anode rays and protons were discovered by which chemist? E. Goldstein
- ▶ What are atoms of an element with the same number of protons but different number of neutrons in the nucleus known as? Isotope
- ▶ Human urine as compared to human blood is hypertonic
- ▶ Which enzyme is present in the saliva? Ptyalin
- ▶ Human blood contains 65% percentage of plasma
- ▶ How many bones are there in a newly born infant? 300
- ▶ Gene control Protein synthesis and heredity
- ▶ Gene is a segment of DNA
- ▶ Fungi are always hetrotrophic
- ▶ Chicken pox is a Viral Disease
- ▶ Measles is a Viral Disease
- ▶ What kind of tea do some herbalists recommend pregnant women drink in the last trimester of pregnancy to strengthen the uterus? Raspberry
- ▶ If you use an over-the-counter remedy for a cold, you may find which herbal ingredient in it? Camphor
- ▶ What causes fluorosis? Taking excess of fluorine
- ▶ In which form is calcium present in our bones? Calcium phosphate
- ▶ What is the light source of a microscope also known as? Illuminator
- ▶ What is the eyepiece of a microscope also known as? Ocular
- ▶ The plant which bears fruit only once in its life time is Banana
- ▶ Amnesia is related to Loss of memory
- ▶ Small pox is caused by Virus
- ▶ Pellagra is skin disease
- ▶ Diabetes is a disease of the Pancreas
- ▶ Photosynthesis involves reduction of  $\text{CO}_2$ , oxidation  $\text{H}_2\text{O}$  and release of  $\text{O}_2$
- ▶ What is the most important thing to consider when choosing a telescope? Aperture
- ▶ Which of the following is a telescope that is not based on light rays? radio telescope
- ▶ What type of telescope is the Hubble? Reflecting
- ▶ Soft drinks such as colas contain significant quantities of caffeine
- ▶ The 'stones' formed in human kidney consist mostly of calcium oxalate
- ▶ Which of these jobs might deal with the Plato scale? Bartender
- ▶ What might you wear if you score high



- on the Hamilton-Norwood scale? Toupee
- ▶ The height of a horse is traditionally measured in hands. How many inches make a hand? 4
  - ▶ How many yards make a furlong? 220
  - ▶ What was the typical daytime temperature on the surface of Mars, as recorded by Viking 1? -22 F
  - ▶ What temperature does butter melt at, approximately? 88 F
  - ▶ What is the ideal temperature for a baby's bottle, and the normal body temperature for a human being? 98.6 F
  - ▶ Hemophilia is inheritable disease
  - ▶ Sickle cell anemia is inheritable disease
  - ▶ Colour blindness Hemophilia is inheritable disease
  - ▶ Modulate-Demodulate is a communications device that enables a computer to transmit information over a telephone line. By what name it is popular? Modem
  - ▶ The famous Silicon Valley is situated in which state of USA? California
  - ▶ If you have light of 5500 Angstroms, what color is it? Green
  - ▶ The Heisenberg Uncertainty Principle states that it is impossible to determine accurately what of fast moving particles simultaneously? position and momentum
  - ▶ Which of the following diseases usually spreads through milk? Tuberculosis
  - ▶ From which part of the plant is turmeric obtained? stem
  - ▶ Food is normally digested in the small intestine
  - ▶ Which part of the body has greatest regeneration power? Liver
  - ▶ Fertilization is the process of Transfer of pollen from anther to stigma
  - ▶ Fertilization in frogs is External
  - ▶ People working in asbestos factories are affected by air pollution. The most affected part of their body is the Lung
  - ▶ Amino acids are the building blocks of Proteins
  - ▶ Why do modern airships such as blimps use helium rather than hydrogen gas? hydrogen gas is highly flammable
  - ▶ What will the colour of litmus paper turn into when dipped in orange juice? Red
  - ▶ What is the nature of water? Neutral
  - ▶ Which acid is used for cleaning cement floors? Hydrochloric acid
  - ▶ Which base is involved in the making of soap? Caustic soda
  - ▶ Potassium chloride is neutral
  - ▶ The 'fizz' in soft drinks is produced by adding which acid? Carbonic acid
  - ▶ A vegetable containing sulphur is Cabbage
  - ▶ Blood does not coagulate inside the body due to the presence of heparin
  - ▶ Banana fruit contains mainly Glucose
  - ▶ Wisdom teeth are Last molars
  - ▶ A drop of blood contains several million cells
  - ▶ Hydra has no blood, but respire?
  - ▶ Which is the sweetest natural sugar? Fructose
  - ▶ The image formed on the retina of the eye is Real and inverted
  - ▶ Insulin controls the metabolism of Sugars
  - ▶ 'Rh' factor is a term that we hear in connection with Blood transfusion
  - ▶ Which is responsible for blue baby syndrome? Nitrate
  - ▶ The Cells which are responsible for the production of antibodies are Lymphocytes
  - ▶ What is the name of the first successfully cloned deer? Dewey



- ▶ The blood group which is universal recipient is AB+
- ▶ What element's three isotopes have different names? Hydrogen
- ▶ What is one of the two most abundant elements in the universe? Hydrogen & Helium
- ▶ What is the PH of water? 7
- ▶ There are currently how many periods on the periodic table? 7
- ▶ Jaundice is caused by a Virus
- ▶ Trachoma is a disease of the Eyes
- ▶ Which of these is closest to room temperature (scientifically speaking)? 70 F
- ▶ The gas used for artificial ripening of green fruits? Acetylene
- ▶ Which is the rarest element in world? Astatine
- ▶ Magnetic field is measured by Flux meter
- ▶ The working of a rocket is based on the principle of Newton's law
- ▶ The minimum volume of water is at a temperature of 4 degree Celsius
- ▶ The human heart beat per minute at an average is 72
- ▶ Time difference between PST and GMT is 5 hours
- ▶ Which country built the first nuclear power station? USA
- ▶ Plaster of Paris is made from Gypsum
- ▶ What is the melting point of diamond? 4000 degree Celsius
- ▶ Virus causes Typhus
- ▶ Cholera is water borne diseases
- ▶ Which organ of body is affected by Typhoid? Intestine
- ▶ Which organ of body is affected by Cirrhosis? Liver
- ▶ Which bacterial infection is characterized by a productive cough, cold sweats at night, and shortness of breath? Tuberculosis
- ▶ The most important photosynthetic pigment? Chlorophyll a
- ▶ Bacteriochlorophylls does not include? Chlorophyll a
- ▶ Molecular formula of chlorophyll b is? C<sub>55</sub> H<sub>70</sub> O<sub>6</sub> N<sub>5</sub> Mg
- ▶ Carotenoids perform protective function in animals & plants
- ▶ About \_\_\_\_\_ % of photosynthesis is carried by terrestrial plants, while rest occurs in ocean, lakes, and ponds? 10%
- ▶ Air contains \_\_\_\_\_ % of CO<sub>2</sub>? 0.03-0.04
- ▶ PS I has chlorophyll a molecule which absorbs maximum light of 700 nm
- ▶ The percentage of light absorbed by the leaf? 1%
- ▶ The first action spectrum was obtained by T.W. Englemam
- ▶ First Actions spectrum was obtained by using Spirogyra
- ▶ Of the following, which one causes higher production of food in green plants? Red
- ▶ Photosynthesis carried out by terrestrial plants is \_\_\_\_\_ of total photosynthesis? 10%
- ▶ Stomata cover only \_\_\_\_\_ of leaf surface? 1-2 %
- ▶ Reduction in photosynthesis is of CO<sub>2</sub>
- ▶ NADPH<sub>2</sub> provides assimilatory power, chemical energy & energized electrons
- ▶ Of the following, which one light - gathering? Antenna complex
- ▶ Photosystem II has molecules which absorbs maximum light of 680 nm
- ▶ Glycolysis takes place in Cytosol
- ▶ Complete breakdown of glucose molecule takes place in Aerobic respiration



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- ▶ In alcoholic fermentation Pyruvic acid is broken down into Ethyl alcohol
  - ▶ In which of the following component of the body, lactic acid fermentation takes place? Muscles
  - ▶ In Anaerobic respiration only 2% of the energy present within the chemical bond of glucose is converted into ATP.
  - ▶ Cellular respiration is essentially a/an \_\_\_\_\_ process? Oxidation
  - ▶ Breaking of terminal phosphate of ATP releases about \_\_\_\_\_ Kcal of energy? 7.3
  - ▶ ATP are consumed during? Glycolysis
  - ▶ From one pyruvate passing through Kreb's cycle, how many NADH are formed? 3
  - ▶ Final acceptor of electrons in respiratory chain is? Oxygen
  - ▶ Carbohydrates, fats & proteins are essential for metabolic processes of an organism & Providing energy & Formation of structures
  - ▶ Magnesium is present in which of the following? Chlorophyll
  - ▶ Deficiency of which of the following causes chlorosis? Nitrogen & Magnesium
  - ▶ Deficiency of  $K^+$  causes Premature death of leaves
  - ▶ Puccinia is a parasitic fungus
  - ▶ Autotrophic organisms can exist in an exclusively \_\_\_\_\_ environment? Inorganic
  - ▶ Strong chlorosis is due to the deficiency of \_\_\_\_\_ in plants? Nitrogen
  - ▶ Stunted growth of roots is due to the deficiency of \_\_\_\_\_ in plants? Phosphorus
  - ▶ Puccinia commonly destroys? Wheat
  - ▶ Nodules on roots of leguminous plants have \_\_\_\_\_ bacteria? Nitrogen fixing
  - ▶ All of the insectivorous plants are true? Autotrophes
  - ▶ The leaf is bilobed with midrib between them. The plant is? Dionaea
  - ▶ Of the following, which one has more variety of nutrition? Animals
  - ▶ Earthworm is an example of \_\_\_\_\_ feeder? Detritus
  - ▶ Of the following, which one is missing in herbivores? Canines
  - ▶ Certain types of whales are also \_\_\_\_\_ feeder? Filter
  - ▶ Hydra is an example of \_\_\_\_\_ feeder? Macrophagous
  - ▶ Parasites capable of living independently of its host at times is called as \_\_\_\_\_ parasite? Facultative
  - ▶ In planaria, numerous small branches which end blindly are called as? Intestinal caeca
  - ▶ Midgut in cockroach is a short narrow tube called? Stomach
  - ▶ The partly digested food is stored in \_\_\_\_\_ in cockroach? Crop
  - ▶ Hunger contractions are \_\_\_\_\_ contractions? Peristalsis
  - ▶ A painful burning sensation produced in the chest cavity usually associated with the back flush of acidic chyme into the esophagus is? Pyrosis
  - ▶ Hepatic and Pancreatic secretions are also stimulated by a hormone produced by the intestinal mucosa. The hormone is? Secretin
  - ▶ It is about 2.4 meter in length and comprising about two fifth of the small intestine? Jejunum
  - ▶ Anus is surrounded by \_\_\_\_\_ types of muscles? 2
  - ▶ Incomplete or imperfect digestion is known as? Dyspepsia
  - ▶ One of the commonest cause of food poisoning are the toxins produced by? Campylobacter
  - ▶ The liquid that escapes during defrosting frozen meat contains \_\_\_\_\_



- ▶ bacteria? Salmonella
- ▶ Loss of appetite due to the fear of becoming obese is? Anorexia nervosa
- ▶ An illness which largely affects girls usually just after the onset of puberty? Anorexia nervosa
- ▶ Masses of dilated tortuous veins in the anorectal mucosa are known as? Hemorrhoids
- ▶ Mastication is carried out by? Teeth
- ▶ Dipeptides into amino acids are converted through? Erypsin
- ▶ Pepsinogen is produced from? Zymogen cells
- ▶ \_\_\_\_\_ respiration is directly involved in the production of energy, necessary for all living activities? Cellular
- ▶ \_\_\_\_\_ respiration is the process by which cell utilized oxygen and produces  $\text{CO}_2$ ? Cellular
- ▶ Air is better respiratory medium.
- ▶ Oxygen contents per liter of air is? 200 ml
- ▶ Water is \_\_\_\_\_ times viscous than air? 50
- ▶ There are \_\_\_\_\_ stomata per square cm of leaf surface in Tobacco plants? 12000
- ▶ The air spaces may comprise upto \_\_\_\_\_ of total volume of leaf surface? 40%
- ▶ The glycolate produced diffuses into the membrane bounded organelles called? Peroxisomes
- ▶ Active site of Rubisco is evolved to bind?  $\text{CO}_2$  &  $\text{O}_2$
- ▶ Number of spiracles present in cockroach is? 20
- ▶ Number of spiracles present in the thorax of cockroach is? 4
- ▶ When abdomen expands, the number of spiracles open is? 8
- ▶ The blood enters the \_\_\_\_\_ side of heart? Posterior
- ▶ Gaseous exchange through the skin is known as \_\_\_\_\_ respiration? Cutaneous
- ▶ Parabronchi are open at Both end/s
- ▶ In most birds air sacs are \_\_\_\_\_ in number? 9
- ▶ Vocal cords are stretched across? Golttis
- ▶ Functional units of lungs are called? Air sacs
- ▶ Lungs are spongy due to the presence of millions of? Alveoli
- ▶ Lungs are covered with double layered thin membranous sac called? Pleura
- ▶ During rest the breathing occurs rhythmically at the frequency of \_\_\_\_\_ times per minute in human? 15-20
- ▶ The maximum amount of oxygen which normal human blood absorbs and carries at sea level is \_\_\_\_\_ per 100 ml of blood? 20 ml
- ▶ Haemoglobin can be almost completely oxygenated by an oxygen pressure of \_\_\_\_\_ of mercury? 100mm
- ▶ The increase in pH of blood has \_\_\_\_\_ effect on the oxygen carrying capacity, of haemoglobin? plus ve
- ▶ % age of  $\text{CO}_2$  carried as carboxyhaemoglobin is? 20%
- ▶ Arterial blood contains \_\_\_\_\_ of  $\text{CO}_2$  per 100 ml of blood? 50 ml
- ▶ More than \_\_\_\_\_ compounds of tar of tobacco smoke are involved to cause cancer? 10
- ▶ A disease of longs in which inside of the lungs is damaged resulting in cough and fever? Emphysema
- ▶ Of the following, which one is a contagious disease? Tuberculosis
- ▶ Which of the following promotes growth in plants? Calvin cycle
- ▶ Vertebrate: Major division of chordate



- animals whose backbone consists of vertebra.
- ▶ Abdomen: The large interior cavity of the body extending from the brim of the privies to the diaphragm.
  - ▶ Alimentary canal: The long coiled tube in human body beginning from mouth and ending at anus and consisting of gullet, oesophagus, stomach, small intestine, large intestine, rectum and anus.
  - ▶ Aorta: The large trunk emerging from the left ventricle of the heart. It distributes purified blood through its branches all over the body.
  - ▶ Aqueous humor: The transparent fluid of the anterior chamber of the eye.
  - ▶ Enzyme: is a catalytic substance promoting a chemical change. In human body these are contained in juices secreted by different glands which help in the digestion of food.
  - ▶ Epilepsy: Disorder marked by disturbed electrical rhythms of the central nervous system and typically manifested by conclusive attacks usually with clouding of consciousness.
  - ▶ Gallbladder: is the pear-shaped pouch situated at the lower border of the liver for the storage of bile and the secretion of mucous.
  - ▶ Gastric juice: is a secretion of the glands in the stomach. It contains hydrochloric acid which destroys bacteria contained in the food and enzymes which help in digesting proteins and fats.
  - ▶ Haemoglobin: A pigment present in blood.
  - ▶ Pancreas: is the long, yellowish gland across the posterior wall of the abdomen secreting juice which digests proteins fats and carbohydrates.
  - ▶ Parathyroid glands: are small endocrine glands near the thyroid glands. The hormones secreted by them regulate the ratio of calcium in blood and growth of body.
  - ▶ Prostrate glands: are the sex glands surrounding beginning portion of urethra.
  - ▶ Pulmonary veins emerge out of lungs. They carry purified blood from the lungs to the left auricle from where it goes to the left ventricle.
  - ▶ Arteries: Blood vessels carrying blood away from the heart.
  - ▶ Arthritis: Inflammation of joints due to infections, metalic or constitutional causes.
  - ▶ Auricles: are two upper chambers of the heart into which the blood comes from the veins.
  - ▶ Bile: is the secretion of the liver poured into duodenum. It is all alkaline and is helpful in digestion, absorption and excretion.
  - ▶ Blood: is a red-coloured fluid circulating through the heart, arteries, capillaries and veins. One cubic millimetre of normal blood contains about 5,000,000 red corpuscles and 6,000 white corpuscles.
  - ▶ The red colour of the blood is due to the presence of a pigment known as haemoglobin.
  - ▶ The total amount of blood in a body is equal to about one-twelfth of the weight of the body.
  - ▶ Blood pressure is the pressure exerted by blood within the arteries.
  - ▶ Cerebrum is the chief and largest part of brain which occupies the upper and frontal two-thirds of entire brain covering all other parts of brain.
  - ▶ Cerebrum is also the centre of intelligence, coordination, memory, will, imagination, etc. It controls voluntary action as well.
  - ▶ Deudenum is the first part of the small intestine where pancreatic juice helps in the digestion of food.
  - ▶ Collagen is the substance that gives elasticity to skin



- ▶ Carbon dioxide we release comes from food we eat
- ▶ Fats are made of carbon, hydrogen and oxygen
- ▶ Protein found in milk is Casein, in beans is Legumes, in meat is myosin and in eggs is albumin
- ▶ Too much presence of the Potassium salt in human blood increase the risk of heart attack.
- ▶ The lack of calcium in the diet causes what condition-Rickets
- ▶ Celluloses are carbohydrates.
- ▶ Milk contains lactose.
- ▶ Glucose is the source of energy for human brain.
- ▶ What creature has 98.4 percent of its DNA n common with humans? The Chimpanzee
- ▶ What constellation must you aim a telescope at to view the Crab nebula? Taurus
- ▶ What's the most concentrated source of energy in a diet-carbohydrates, fat or protein? Fat
- ▶ What taste are cats unable to detect? Sweet
- ▶ What was the most lethal infectious disease of 1990? Pneumonia
- ▶ What occurred in the Atacama Desert for the first time in 400 years, in 1971? Rain
- ▶ What Hawaiian volcano first erupted in the 1970s and has done so regularly since 1983? Kilauea
- ▶ What explorer introduced pigs to North America? Christopher Columbus
- ▶ The actual Earth-Moon distance ranges from about 360,000 to 405, 000 kilometers, depending on the position in the Moon's orbit.
- ▶ The Earth is about 13 thousand kilometers (8000 miles) wide, whereas the Sun is roughly 1.4 million kilometers (900,000 miles) across.
- ▶ Which planet is closest to the sun? Mercury
- ▶ The Sun is, at present, about 70% hydrogen and 28% helium by mass everything else amounts to less than 2%
- ▶ The earth is about 4.6 billion years old.
- ▶ Jupiter is the fastest spinning planet in our solar system rotating on average once in just under 10 hours
- ▶ If the Sun were a hollow ball, you could fit about one million Earths inside of it
- ▶ Venus is the slowest spinning planet in the solar system. It rotates only once every two hundred forty-three Earth days
- ▶ The orbital period of Mars is 686.9726 days.
- ▶ The movements of the sunspots indicate that the Sun rotates once every 27 days at the equator, but only once in 31 days at the poles.
- ▶ The Milky Way is actually a giant, as its mass is probably between 750 billion and one trillion solar masses, and its diameter is about 100,000 light years.
- ▶ The Milky Way is a spiral galaxy.
- ▶ What star other than the sun is closest to the earth? Proxima Centauri, the nearest member of the Alpha Centauri triple star system
- ▶ What disease prompted polio vaccine inventor Dr. Jonas Salk to come out of retirement in 1987? AIDS
- ▶ What was the occupation of cotton candy machine inventor William James Morrison? Dentist
- ▶ Who averaged one invention for every three weeks of his life? Thomas Edison
- ▶ CPR stand for in medical emergencies? Cardiopulmonary resuscitation
- ▶ What disease accounts for two of every three cases of dementia? Alzheimer's



- ▶ Scoliosis is defined as "a lateral curvature of the spine"
- ▶ What substance produced by the body is counteracted by antihistamine drugs? Histamine
- ▶ What's most likely to occur when your diaphragm goes into spasms? Hiccups
- ▶ What's the itchy skin condition tinea pedis better known as? Athlete's foot
- ▶ What arthritic disorder occurs due to increased uric acid the blood? Gout
- ▶ What hereditary blood defect is known as "the royal disease"? Hemophilia
- ▶ What organ is inflamed when one has encephalitis? The brain
- ▶ Where does the embryo implant itself in a tubal pregnancy? A Fallopian tube
- ▶ How many of every 10 victims infected by the Ebola virus will die in two days? Nine
- ▶ What does the "myo" mean in myocardial? Muscle
- ▶ What was bovine spongiform encephalopathy called by the British press in 1996? Mad cow disease
- ▶ What's the medical term for low blood sugar? Hypoglycemia
- ▶ What's the tranquilizer diazepam better known as? Valium
- ▶ What's the common term for a cerebrovascular accident? Stroke
- ▶ What was Friedrich Serturmer the first to extract from opium and use as a pain reliever? Morphine.
- ▶ What syndrome does SIDS mean to child care experts? Sudden infant death syndrome.
- ▶ What disease is the focus of oncology? Cancer
- ▶ Where is liver bile stopped before being released into the small intestine? The gall bladder
- ▶ Water also regulates the temperature of the human body
- ▶ A cow must drink four gallons of water to produce one gallon of milk.
- ▶ The air we breathe is 78% nitrogen, 21.5% oxygen, .5% argon and other gases.
- ▶ The three most common elements in the universe are 1) hydrogen; 2) helium; 3) oxygen.
- ▶ What food is the leading source of salmonella poisoning? Chicken.
- ▶ What country saw the cultivation of the first potato, in 200 A.D.? South America
- ▶ What added ingredient keeps confectioners' sugar from clumping? Corn starch
- ▶ What ingredient in fresh milk is eventually devoured by bacteria, causing the sour taste? Lactose
- ▶ What falling fruit supposedly inspired Isaac Newton to write the laws of gravity? An Apple
- ▶ Light year is a distance light travels in a year
- ▶ What is measured on the Gay-Lussac scale: Alcohol strength
- ▶ Law of floating bodies was given by Archimedes
- ▶ Speed of sound is faster in hot air than in cold air
- ▶ Ultrasonic are sound waves of high frequency = 12000 cycles/sec and higher
- ▶ Sound travels faster in moist air than in dry air
- ▶ Zooplankton is a collection of various species of plankton.
- ▶ Non-living factors that can affect life, like soil, nutrients, climate, wind etc are Abiotic Factors
- ▶ Xenobiotic: A compound that is foreign to the biological systems.
- ▶ Xerophile: An organism that is capable of growing at low water potentials, that is, in very dry habitats.



- ▶ Rain Gauge: is an apparatus for recording of rainfall at a particular place.
- ▶ Cloning is the process of creating an identical copy of an original organism or thing.
- ▶ A clone in the biological sense, therefore, is a single cell (like bacteria, lymphocytes etc.) or multi-cellular organism that has been directly copied from, and is therefore genetically identical to, another living organism.
- ▶ The term clone is derived from the Greek word for "twig".
- ▶ Molecular cloning refers to the procedure whereby a DNA sequence is amplified by genetic engineering techniques.
- ▶ Cloning is frequently employed to amplify DNA fragments containing genes, an essential step in their subsequent analysis.
- ▶ Cloning of any DNA sequence involves the following four steps: amplification, ligation, transfection, and screening/selection.
- ▶ Cloning means to create a new organism with the same genetic information as a cell from an existing one (identical). It is an asexual method of reproduction, where fertilization or inter-gamete contact does not take place
- ▶ The first animal clone was a frog, cloned by Thomas J. King and Robert W. Briggs in 1952.
- ▶ The first Mammal clone was a sheep, cloned Briggs in 1997.
- ▶ The term clone is used in horticulture to mean all descendants of a single plant, produced by vegetative reproduction or apomixis.
- ▶ Cloning is very common in single-celled organisms, which clone themselves via binary fission, e.g. paramecium, bacteria, many algae. Cloning is also very widespread in plants, where it is often called vegetative reproduction.
- ▶ Libertarian views on the subject suggest that it is within a person's constitutional rights to conduct this process, similar to abortion rights.
- ▶ Dolly the sheep was born after 277 eggs were to create 29 embryos, which only produced three lambs at birth, only one of which lived, Dolly.
- ▶ Dolly (1996-2003) was the first mammal to have been successfully cloned from an adult cell. She was cloned at the Roslin Institute in Scotland and lived there until her death when she was 6. Her birth was announced on 1997-02-22. The name "Dolly" came from a suggestion by Jesse Haase who helped with her birth, in honor of Dolly Parton. because it was a mammary cell that was cloned.
- ▶ Thiamine deficiency causes beriberi
- ▶ Niacin deficiency causes pellagra
- ▶ Aerodynamics: the study of the motion of gas on objects and the forces created by gases.
- ▶ Anatomy: the study of the structure and organization of living things
- ▶ Anthropology: the study of human cultures both past and present
- ▶ Archaeology: the study of the material remains of cultures
- ▶ Astronomy: the study of celestial objects in the universe
- ▶ Biochemistry is the study of the organic chemistry of compounds and processes occurring in organisms
- ▶ Biophysics is the application of theories and methods of the physical sciences to questions of biology
- ▶ Ecology: the study of how organisms interact with each other and their environment
- ▶ Environmental Science: the science of the interactions between the physical, chemical, and biological components of the environment
- ▶ Forestry: the science of studying and



managing forests and plantations, and related natural resources

- ▶ Genetics: the science of genes, heredity, and the variation of organisms
- ▶ Geology: the science of the Earth, its structure, and history
- ▶ Marine Biology: the study of animal and plant life within saltwater ecosystems
- ▶ Medicine: the science concerned with maintaining health and restoring it by treating disease
- ▶ Microbiology: the study of microorganisms, including viruses, prokaryotes and simple eukaryotes
- ▶ Molecular Biology: the study of biology at a molecular level
- ▶ Zymogenous Flora refers to microorganisms that respond rapidly by enzyme production and growth when simple organic substrates become available.
- ▶ What is "diamond ink"? Colloidal silver ink
- ▶ A mixture of HF, BaSO<sub>4</sub>, and fluorides for etching glass
- ▶ Colloidal diamond ink for marking metal
- ▶ Carbon disulfide-based ink for marking diamonds
- ▶ Compound containing both an amino and a carboxylic acid group is called Amino Acid
- ▶ The amount of heat required to raise the temperature of one gram of water from 14.5°C to 15.5°C is called Calorie.
- ▶ 1 calorie is equal to 4.184 joules.
- ▶ A substance capable of causing or producing cancer in mammals is called Carcinogen
- ▶ A substance that speeds up a chemical reaction without being consumed itself in the reaction is called Catalyst
- ▶ Ecology is the study of the balance of nature, how different living beings and inanimate objects function together as a

harmonious whole.

- ▶ Endemic is a disease which becomes prevalent in a particular area on account of its surrounding conditions.
- ▶ Enzymes are organic catalysts which actually accelerate the chemical reactions occurring in the living organism.
- ▶ Enzyme lipase accelerates the hydrolysis of fat
- ▶ Enzyme diastase helps the conversion of starch to glucose
- ▶ Enzyme zymase quickens fermentation of sugar to alcohol.
- ▶ Epidemic is a disease which attacks many people in a particular area at one time.
- ▶ Exobiology is the new science which deals with life or possibilities of life existing beyond the earth i.e. on other planets.
- ▶ Fossils are the waste product from thermal power stations using coal. The strategic metal, germanium can be extracted from fly ash.
- ▶ Fungi are a class of plants which have no chlorophyll.
- ▶ Gene is an elementary unit of heredity. It occurs along the length of the chromosomes which surround the nuclei.
- ▶ The code of life by which inherited characteristics are handed down from one generation to another is called Genetic Code.
- ▶ Green House (Glass House) is a heating influence by solar radiation reaching ground surface, allowed by CO<sub>2</sub>, ozone, dust, water, vapors, atmosphere etc.
- ▶ Hemoglobin is a red pigment present in the blood functioning as an oxygen carrier.
- ▶ Hibernation is a condition of sleep during certain parts of the year.



- ▶ Hormones are chemical substances produced by ductless or endocrine glands.
- ▶ The Chemical formula for water is  $H_2O$  & heavy water is  $D_2O$ .
- ▶ Implosion is a technique for detonating underground nuclear devices.
- ▶ Metabolism is chemical process concerned with the burning and regeneration of tissues occurring in living organisms.
- ▶ Myopia is a Short-sightedness.
- ▶ A myopic man cannot see distant objects clearly while he can see near objects quite clearly.
- ▶ Nitrogen has the property of reacting under special conditions to form a number of useful products is called Nitrogen Fixation.
- ▶ Owing to Nitrogen Fixation the free atmospheric nitrogen is converted into so many nitrogenous compounds.
- ▶ The process of Photosynthesis results in the formation of a new compound of the same empirical formula but greater molecular weight.
- ▶ Protoplasm is the living matter present in the cells of animal and vegetable life.
- ▶ Psychedelic drugs are the drugs which produce a mental state of great calm.
- ▶ The process of transmission of heat in straight lines without heating the intervening medium is called Radiation
- ▶ Removing the power of procreation by means of operation is called Sterilization
- ▶ Virus is small microscopic agent containing nucleic acid capable of multiplying in an organism
- ▶ Doctors help patients with different ear problems and help children who are either deaf or mute to learn to communicate are called Audiologists
- ▶ Doctors who help in treating different kinds of allergies and immune system disorders like hay fever, asthma, etc. are called Allergists
- ▶ The andrologist helps in diagnosing and treating disorders related to the male reproductive system are called
- ▶ Which of the following animals has a respiratory system with one way flow of the air through the lungs, and the air is renewed after inspiration? Aves
- ▶ Voice box is another name used for? Larynx
- ▶ Respiratory distress syndrome is common especially for infants with a? Less than 7 month
- ▶ There are \_\_\_\_\_ types of nutrients needed by plants besides light to carry out photosynthesis? Three
- ▶ The site/s where most of the uptake of water and minerals take place is/are? Root hairs
- ▶ The uptake of water in plants involves? Passive transport
- ▶ The membrane of vacuoles is known as? Tonoplast
- ▶ The diffusion of ions along with water also takes place by mass flow system along the \_\_\_\_\_ path? Apoplast
- ▶ Active transport is dependent on? Respiration
- ▶ In plants, the neighbouring cells are connected with one another by? Plasmodesmata & Cell walls
- ▶ In the root cells \_\_\_\_\_ pathway becomes discontinuous in the endodermis due to the presence of casparian strip? Apoplast
- ▶ Cytoplasmic strands that extend through pores in adjacent cell walls are known as? Plasmodesmata
- ▶ In plants, water potential is determined by major factors? Two
- ▶ The pressure generated when water enters & inflates plant cells is called \_\_\_\_\_ potential? Pressure
- ▶ The movement of water molecules from



a region of higher water potential to a region of lower water potential (through membrane)? Osmosis

- ▶ \_\_\_\_\_ potential is the measure of the change in water potential of a system due to the presence of solute molecules? Osmotic
- ▶ Commonly in other plants than tall ones the speed of upward movement of water is?  $1 \text{ m h}^{-1}$
- ▶ Exceptionally the positive hydrostatic pressure generated by root pressure is about? 800 Kpa
- ▶ Cuticular transpiration is \_\_\_\_\_ of total transpiration? 5-7%
- ▶ All plants do not possess? Lenticels
- ▶ Lenticular transpiration is \_\_\_\_\_ of total transpiration? 1-2%
- ▶ Aerating openings formed in the bark through which exchange of gases takes place and water is lost in the form of vapours are? Lenticels
- ▶ Lenticels look like? Cars or small protusions
- ▶ Stomatal transpiration is \_\_\_\_\_ of total transpiration? 90%
- ▶ They function as multisensory hydraulic valve? Guard cells
- ▶ There are \_\_\_\_\_ hypothesis which may explain opening and closing of stomata? Two
- ▶ Stomata open due to \_\_\_\_\_ of  $K^+$  into the guard cells from the surrounding epidermis? Active transport
- ▶ Low level of  $CO_2$  favours \_\_\_\_\_ of the stomata? Opening
- ▶ The opening and closing of stomata is directly controlled by the? Light
- ▶ Symbionts which help plants in uptake of phosphorous and trace metals such as zinc and copper? Fungi
- ▶ Transport of minerals from soil to epidermal cells of roots via carrier protein molecules along their concentration gradient is called?

Facilitated diffusion

- ▶ Pulling upward of water and dissolved minerals towards the leaves through the xylem tissue is called? Transpiration pull
- ▶ Pressure flow theory was proposed by? Earnst Munch
- ▶ A pressure created by active secretion of salts and other solutes from other cells into xylem sap is called? Root pressure
- ▶ Addition of salts and other solutes from other cells into xylem sap, \_\_\_\_\_ the water potential of the xylem sap? Lowers.
- ▶ Open circulatory system can contain? White Blood Cells
- ▶ Single circuit heart is found in? Fishes
- ▶ It has been estimated that in a normal person plasma constitutes about \_\_\_\_\_ by volume of blood? 55%
- ▶ 95% of the cytoplasm of red blood cells is the? Haemoglobin
- ▶ Monocyte give rise to macrophages, which destroy larger particles by phagocytosis.
- ▶ Antibodies are proteins in nature
- ▶ Interferons are proteins in nature
- ▶ Antitoxins are proteins in nature
- ▶ Cooley's anemia is another name used for? Thalassaemia
- ▶ Tricuspid valve is present? Between right atrium and right ventricle
- ▶ QRS complex represents? Ventricular systole
- ▶ Which of the following have thickest walls? Arteries
- ▶ It is the measure of force with which blood pushes up against the walls of blood vessels? Blood pressure
- ▶ It is the discharge of blood from blood vessels? Cerebral Hemorrhage
- ▶ The flow of lymph is maintained by



- movement of viscera, breathing movements & valves
- ▶ Introduction of vaccine within the body to produce immunity is an example of? Artificially induced active immunity
  - ▶ Which of the following marine fishes are considered direct descendents of fresh water ancestors? Bony fishes
  - ▶ Which of the following fishes excrete large volume of diluted urine? Fresh water fishes
  - ▶ Terrestrial animals like kangaroo rat survive even without drinking water since? They are anhydrobiotic organisms
  - ▶ The characteristic which enable animals to tolerate dehydration is called? Anhydrobiosis
  - ▶ Which excretory product is produced in plants during autotrophic mode of life?  $O_2$
  - ▶ In plants which of the following is a waste product produced both during photosynthesis and respiration?  $H_2O$
  - ▶ Which of the following structure in plant's body is called excretophores? Leaves
  - ▶ In animals excess of nitrogen is excreted primarily in form of? Ammonia
  - ▶ Purine and pyrimidine catabolism results in production of? Xanthine
  - ▶ Which of the following is most toxic? Ammonia
  - ▶ Aquatic animals excrete nitrogenous waste commonly in the form of? Ammonia
  - ▶ Amount of water required to excrete 1gN of Urea is? 50 ml
  - ▶ Which of the following animal excrete nitrogenous waste mainly as uric acid? Birds
  - ▶ Hydra has no specialized excretory system because the whole body cells are in contact with water
  - ▶ Each nephridium of earthworm opens to the exterior by? Nephridiopore
  - ▶ The nephridia of earthworm open into the coelom by? Nephrostome
  - ▶ Which of the following openings have cilia? Nephrostome
  - ▶ The distal blind end of the malpighian tubules bathes freely in? Haemocoel
  - ▶ The main nitrogenous waste formed in the body of earthworm is/are? Urea
  - ▶ Protonephridia are present in? Flatworm
  - ▶ Nephrostome in earthworm opens in? Internal Body cavity
  - ▶ Which of the following excretory structure is associated with gut of the organism? Malpighian tubules
  - ▶ Malpighian tubules absorb waste materials and salts from? Hemolymph
  - ▶ Which of the following is a segmentally arranged excretory system? Metanephridium
  - ▶ In Urea cycle \_\_\_\_\_ ammonia molecules combine with 1  $CO_2$  molecule to form 1 molecule of urea? 2
  - ▶ Excessive lactic acid is converted into \_\_\_\_\_ by liver? Glycogen
  - ▶ Each human kidney receives \_\_\_\_\_ % of total cardiac output? 20%
  - ▶ Which of the following nephrons play important role in production of concentrated urine? Juxtramedullary
  - ▶ Which of the vascular channels are related to Juxtramedullary nephrons only? Vasa recta
  - ▶ Which of the following filtrate contains excessive amount of amino acids, glucose, and salts? Glomerular filtrate
  - ▶ Which of the following constituent is/are maximum in the filtrate that leaves proximal convoluted tubules? Nitrogenous waste
  - ▶ Mammalian kidney, under restricted water supply can conserve water by over \_\_\_\_\_ % reabsorption of



glomerular filtrate? 99.50%

- ▶ On which of the following site the posterior pituitary hormone acts predominantly? Collecting tubules
- ▶ Which of the following kidney stones are most common? Calcium oxalate
- ▶ A stone measuring 0.4 cm, blocking the outlet of renal pelvis resulting in mild to moderate tract obstruction. Which of technique will be opted to remove this stone? Extracorporeal Shock wave lithotripsy
- ▶ Which of the following mechanism explains development of anemia in Renal failure? Failure of proper RBC synthesis, due to lack of chemical stimulation
- ▶ Formation of heat shock proteins in plants results in? Embracing the enzymes and other proteins and prevent their denaturation.
- ▶ Which adaptation is acquired by plants of cooler areas to prevent lipid crystal formation in cell membrane? Increase in proportion of unsaturated fatty acids
- ▶ Animals that produce metabolic heat at low level and also absorb heat from the surroundings are called? Heterotherms
- ▶ Fishes, most of the invertebrates and amphibians are examples of \_\_\_\_\_ animals? Ectotherms
- ▶ Which highly contagious infection begins with mild, cold-like symptoms, then produces severe, uncontrollable coughing fits? Whooping Cough
- ▶ Which organ of human body is affected by Dermatitis? Skin
- ▶ Amoebae are tiny formless jelly-like masses which cause amoebic dysentery, malaria etc.
- ▶ Bacteria are minute unicellular organisms that multi-PLY very fast.
- ▶ Fungi are plants lacking green colouring matter.
- ▶ Lassa fever is a Viral Disease

- ▶ Filtration of wastes from the blood in human body is done by Kidney
- ▶ Which is a semi conductor? Germanium
- ▶ normal blood pressure of man is 80/120 mm HG
- ▶ The largest gland in human body is Liver
- ▶ Acetyl salicylic acid is commonly known as Aspirin
- ▶ Name of scientist who first declared that the earth revolves around the sun? Copernicus
- ▶ Which of the following is the most toxic gas? Carbon monoxide
- ▶ In a refrigerator, cooling is produced by the evaporation of a volatile liquid
- ▶ Cream gets separated from milk when it is churned because of centrifugal force
- ▶ When a ball drops on to the floor it bounces. Why does it bounce? The floor heats up on impact
- ▶ The minimum height of a plane mirror to see the full image of a person is equal to half the height of the person
- ▶ The blackboard seems black because it does not reflect any colour
- ▶ If a ship moves from freshwater into seawater, it will rise a little higher
- ▶ Water is a good coolant and is used to cool the engines of cars, buses, trucks, etc. It is because water has a high specific heat
- ▶ Light travels slower in glass than in air because refractive index of air is less than that of glass.
- ▶ A spherical air bubble is embedded in a piece of glass. For a ray of light passing through the bubble, it behaves like a diverging lens
- ▶ Poliomyelitis is a Viral Disease
- ▶ Rubella is a Viral Disease
- ▶ Coccidioidomycosis is a Fungal infectious disease



- ▶ Cryptococcosis is a Fungal infectious disease
- ▶ Fungi are plants reproduce rapidly and are responsible for the decay of food, fabrics, timber, etc.
- ▶ To man Fungi causes infection of the jaw, large intestine and sometimes the lungs.
- ▶ Nitrogenous food is Protein
- ▶ Amoeba does not have nervous system? Amoeba
- ▶ In a human body, the basic building block is Cells
- ▶ The function of DNA in the body is To help in the synthesis of proteins
- ▶ Iron sheets are galvanized by dipping them into what molten metal? Zinc
- ▶ By nature, what types are the oxides of most metals? Basic
- ▶ Which of these metals is magnetic? Cobalt
- ▶ Which of these metals often occurs naturally in the pure state? Gold
- ▶ Which metal is extracted from hematite? Iron
- ▶ Gold is a noble metal?
- ▶ Bleach is another useful household chemical. It is often referred to as "chlorine bleach", but this is a misnomer. What is the main component of household bleach? Sodium hypochlorite
- ▶ Which has been used as the active ingredient in nail polish remover? Acetone
- ▶ Which part of a plant respire? Leaf
- ▶ Haemophilia is mostly associated with Royal families
- ▶ Which one is an example of vestigial organ in man? Ear Muscles
- ▶ Why do birds not have respiratory trouble at the time of flying at high altitude? They have extra air sacs
- ▶ In making the saffron spice, which part of the plant is used? Stigma
- ▶ The least distance of distinct vision for a normal eye is 25 cm
- ▶ The vital constituent of blood that helps in clotting is Platelets
- ▶ The "stones" formed in human kidney consist mostly of Calcium oxalate
- ▶ The role of chlorophyll in photosynthesis is Absorption of light
- ▶ Herbicides are chemicals which control? Weeds
- ▶ Process of breeding fish in ponds and artificial reservoirs is known as Pisciculture
- ▶ What is dry ice? Solid carbon dioxide
- ▶ The substance in the middle of the lead pencils that does the writing actually isn't lead at all; what is it? Graphite
- ▶ Another common adhesive used around the home is woodworking glue. What is the major component of this adhesive? Poly (vinyl acetate)
- ▶ Aspirin can be found in many household medicine cabinets. But what is it chemically? Acetylsalicylic acid
- ▶ What is the name of the pigment that gives the green colour to plants? Chlorophyll
- ▶ Which metal oxide is often added to paint to make it bright white? Titanium dioxide
- ▶ What is the pigment in the skin of oranges that gives it the orange colour? Carotene
- ▶ What is the name of the pigment that gives tomatoes their red colour? Lycopene
- ▶ Which expensive spice has a beautiful yellow colour and is used not only in food, but also as a dye? Saffron
- ▶ Fat is a Lipid
- ▶ What is meant by myopia? Short-sightedness



- ▶ The percentage of glucose present in the normal urine is 0.1%
- ▶ Penicillin is an antibiotic developed from fungi.
- ▶ Spirochaetes have a corkscrew shape and move unlike bacteria.
- ▶ Syphilis and spirochaetal jaundice are diseases caused by Spirochaetes.
- ▶ Populations are groups of organisms of the same species living in a specific community.
- ▶ Populations may increase in size or shrink depending on a number of environmental factors.
- ▶ A population is limited to a specific species. A population could be a species of plant, species of animal, or a bacterial colony.
- ▶ A living organism is a single individual of a species that exhibits the basic characteristics of life.
- ▶ Living organisms are highly ordered and have the ability to grow, develop, and reproduce.
- ▶ Organ systems are groups of organs within an organism.
- ▶ Atmosphere covers both the land and the water surface. It is bound to the earth by the gravitational pull of the earth.
- ▶ Upto about a height of 50 km from the earth, the atmosphere is composed of Nitrogen 78.09%, Oxygen 20.95%, Argon 0.93%, and minor gases (Carbon dioxide, hydrogen, neon, helium, methane, xenon, krypton, etc.) 0.03%
- ▶ The leaf is the site of photosynthesis in plants. Photosynthesis is the process of absorbing energy from sunlight and using it to produce food in the form of sugars.
- ▶ Leaves make it possible for plants to fulfill their role as primary producers in food chains.
- ▶ Leaves can be found in a variety of shapes and sizes. Most leaves are broad, flat and typically green in color.
- ▶ Some plants, such as conifers, have leaves that are shaped like needles or scales. Leaf shape is adapted to best suit the plant's habitat and maximize photosynthesis.
- ▶ Basic leaf features in angiosperms (flowering plants) include the leaf blade, petiole and stipules.
- ▶ Blade - broad portion of a leaf.
- ▶ Leaf tissues are composed of layers of plant cells. Different plant cell types form three main tissues found in leaves.
- ▶ Leaf tissues include a mesophyll tissue layer that is sandwiched between two layers of epidermis.
- ▶ Leaf vascular tissue is located within the mesophyll layer.
- ▶ The outer leaf layer is known as the epidermis. The epidermis secretes a waxy coating called the cuticle that helps the plant retain water.
- ▶ The epidermis in plant leaves also contains special cells called guard cells that regulate gas exchange between the plant and the environment.
- ▶ The middle mesophyll leaf layer is composed of a palisade mesophyll region and a spongy mesophyll region.
- ▶ Palisade mesophyll contains columnar cells with spaces between the cells. Most plant chloroplasts are found in palisade mesophyll.
- ▶ Chloroplasts are organelles that contain chlorophyll, a green pigment that absorbs energy from sunlight for photosynthesis.
- ▶ Spongy mesophyll is located below palisade mesophyll and is composed of irregular shaped cells. Leaf vascular tissue is found in spongy mesophyll.
- ▶ Leaf veins are composed of vascular tissue. Vascular tissue consists of



tube-shaped structures called xylem and phloem that provide pathways for water and nutrients to flow throughout the leaves and plant.

- ▶ In the Calvin Cycle, carbon dioxide is converted to the sugar glucose. These reactions occur in chloroplast stroma.
- ▶ Dark reactions occur during the day in most plants. Dark reactions are light-independent and use energy molecules generated in the light reaction phase to produce carbohydrates.
- ▶ Light reactions in photosynthesis mostly occur in grana. These are dense layered stacks of thylakoid sacs found in plant chloroplasts.
- ▶ Light reactions in photosynthesis mostly occur in which part of the chloroplast? Grana
- ▶ Chrysophytes are the most abundant unicellular algae in the oceans.
- ▶ Pyrrophytes are unicellular, photosynthetic, and mostly aquatic.
- ▶ Like pyrrophytes, euglenophytes are small unicellular freshwater organisms with two flagella.
- ▶ Oomycetes are filamentous organisms which resemble fungi, in that they live as saprotrophs.
- ▶ Oomycetes differ from other moulds with the presence of spores and their sexual life cycle.
- ▶ Hydrosis is the medical term for what – Sweating
- ▶ On a standard rainbow what colour is on the inside of the curve Violet
- ▶  $C_n(H_2O)_n$  is a general formula of? Monosaccharides
- ▶ Which of the following carbohydrate is tasteless? Polysaccharide
- ▶ Monosaccharide carbohydrate cannot be hydrolysed
- ▶ Ribose is an example of Pentose
- ▶ Al-'Abbas ibn Sa'id al-Jawhari was a

geometer who worked at the House of Wisdom in Baghdad and for in a short time in Damascus where he made astronomical observations.

- ▶ Most important work of Al-'Abbas ibn Sa'id al-Jawhari was his Commentary on Euclid's Elements which contained nearly 50 additional propositions and an attempted proof of the parallel postulate.
- ▶ The Al-Biruni crater, on the Moon, is named after him. He was also the first Muslim scholar to study India and the Brahminical tradition.
- ▶ The region of a fertilized egg where meiosis is completed is called Animal pole. It contains less yolk and is more metabolically active than the opposite vegetal pole.
- ▶ A lobe of the pituitary gland that produces prolactin and growth hormone as well as hormones that regulate hormone production in other glands is called Anterior pituitary.
- ▶ The three nucleotide sequence in the RNA molecule, that is complementary to three bases of an amino acid specifying codon in messenger RNA is called Anticodon.
- ▶ The blood serum containing antibodies is called Antiserum.
- ▶ Hardening and thickening of the wall of an artery is called Arteriosclerosis.
- ▶ Any eukaryotic chromosome that is not a sex chromosome; autosomes are present in the same number and kind in both males and females of the species is called Autosome.
- ▶ A plant hormone that influences many plant functions, including phototropism, apical dominance and root branching; generally stimulates cell elongation and in some cases, cell division and differentiation is called Auxin.
- ▶ A long extension of a nerve cell, extending from the cell body to synaptic endings on other nerve cells or on muscles is called Axon.



- ▶ A virus that infects bacterial cells, also called a phage is called Bacteriophage.
- ▶ A complementary pair of nucleotide bases, containing a purine and a pyrimidine is called Base pair.
- ▶ The circulating pathway of an element through the biotic and abiotic components of an ecosystem is called Biogeochemical cycle.
- ▶ The study of geographic distribution of life on earth, biogeographers attempt to explain the factors that influence where species of plants and animals live on earth is called Biogeography.
- ▶ The weight of all the living organisms in a given population, area, or other unit being measured is called Biomass.
- ▶ A major terrestrial community characterized by certain climatic conditions and dominated by particular types of plants is called Biome.
- ▶ The thin shell of air, land, and water around the earth that supports life is called Biosphere.
- ▶ Homologous chromosomes, each having sister chromatids, that are joined by a nucleoprotein lattice during meiosis; also called a tetrad is called Bivalent.
- ▶ The use of a natural biological system to produce a product or to achieve an end desired by humans is called Biotechnology.
- ▶ The fluid filled cavity of blastula is called Blastocoel.
- ▶ Standard pressure is 760 mm or 14.7 lb/in<sup>2</sup>.
- ▶ Gross is equal to 12 dozens
- ▶ Mach 2 is equal to 500 miles per hour
- ▶ 1 nautical mile is equal to 1825 meters
- ▶ Force is measured in Newton (SI), Dyne (CGS)
- ▶ At -40 deg F Fahrenheit scale is equal to centigrade scale
- ▶ Yaqub ibn Ishaq al-Kindi also known by the Latinized version of his name Alkindus to the West, was a Muslim Arab scientist, philosopher, mathematician, physician, astronomer and musician.
- ▶ Al-Kindi was the first of the Muslim peripatetic philosophers, and is well known for his efforts to introduce Greek philosophy to the Arab world.
- ▶ Osmosis is the diffusion of water molecules.
- ▶ Pepsin produced in stomach which helps to digest the Proteins
- ▶ Malarial Parasite was invented by Ronald Ross
- ▶ When a cell is surrounded by solution of equivalent solute concentration, the solution is said to be isotonic to the cell, and the net movement of water is absent
- ▶ When a cell is surrounded by solution of higher solute concentration, the solution is said to be hypertonic to the cell, and the net movement of water is out of the cell
- ▶ When a cell is surrounded by solution of lower solute concentration, the solution is said to be hypotonic to the cell, and the net movement of water is into the cell
- ▶ After a height of 50 km above the earth's surface the atmosphere is made up of atomic oxygen (O<sub>2</sub>), ozone (O<sub>3</sub>), helium and hydrogen.
- ▶ Parasites are small organisms living on the skin of lice, fleas and the parasites of scabies.
- ▶ Parasites act as carriers of the germs of disease. Germs of plague are conveyed by fleas, of typhus by louse, and of malaria and yellow fever by mosquito.





- ▶ The cells that make up neurilemma in nerve tissue are Schwann cells
- ▶ The cell that lacks a nucleus is Red blood corpuscles in man
- ▶ Red pigment is formed in Cell sap in vacuoles of the leaf
- ▶ The primary energy for living organisms is Solar energy
- ▶ What is Penicillin? Antibiotic
- ▶ Autophagy is the function of Lysosomes
- ▶ Depending upon their structure and function lysosomes are categorized into three types
- ▶ Vacuoles are bound by a definite membrane in plant cells called Tonoplast
- ▶ Endoplasmic reticulum is bound by Membranes
- ▶ Which gases would you find in a soft drink?  $\text{CO}_2$
- ▶ What is the chemical symbol for the element mercury? Hg
- ▶ Nitrous oxide is also known as what? Laughing gas
- ▶ The sun arises on the North pole on the 21st march and this pole remains in light till what date? 23rd September
- ▶ Name the gas which was discovered on the sun about 125 years ago during eclipse-watching? Helium
- ▶ The gas used in Soda water is Carbon dioxide
- ▶ The stars are not visible in the day time because of sun's brightness during day time
- ▶ The green colour of water in a lake is due to excessive growth of sea weeds
- ▶ Milk of animal fed on grass contains large amount of a fat in summer
- ▶ Which of the following enters human body through skin? Ring Worm
- ▶ Which part of the human body is damaged by the disease called encephalitis? Brain
- ▶ The gland which is attached to the digestive system but does not have any role to play in digesting food is Liver
- ▶ Dehydration in human body results due to loss of Water
- ▶ Which among the following acts as a resistance against disease in the body? White corpuscles
- ▶ The most common cause of water pollution in Pakistan is sewage
- ▶ Main cause of blindness in Pakistan is cataract
- ▶ Maximum absorption of dietary food takes place on small intestine
- ▶ Fat is stored in human body in Adipose tissue
- ▶ Ibn Baitar was a renowned Muslim Botanist
- ▶ Chicken egg is composed of one cell
- ▶ Starch is a polymer of Glucose
- ▶ Epidemic diseases are a violent outbreak of a disease affecting great numbers at one time and one place and are capable of travelling from one place to another.
- ▶ Endemic diseases are those which are more or less' constantly present in a population or area.
- ▶ Germs enter the body through some scratch or-cut on the skin as in Lockjaw.
- ▶ Ice Floats on Water Because Ice less dense than Water



- ▶ Food is readily cooked in a pressure cooker because boiling occurs at high temperature
- ▶ After long periods of use, a gray spot develops on the inside of a bulb. This is because the tungsten filament evaporates and collects there
- ▶ The blue colour of the clear sky is due to dispersion of light
- ▶ Sunspots are the dark patches having less temperature than the normal surface of the sun
- ▶ Why do wet clothes dry more quickly on a warm day? High temperature of the air helps fast evaporation
- ▶ Which is the most distant object visible to the eye? Andromeda galaxy
- ▶ Which is the brightest star? Sirius
- ▶ A shooting star is basically a Meteor
- ▶ A fresh egg sinks in pure water but floats in a saline water because saline water is denser than pure water
- ▶ A Mitochondria possesses a Double membrane
- ▶ Within the cell, the site of respiration is Mitochondria
- ▶ Which plays an important part in photosynthesis? Chloroplast
- ▶ This is the lightest of all the gases, and readily combines with other elements, often explosively? Hydrogen
- ▶ Which his gas is used with helium in making gas lasers, but is no doubt better known for its use in lighting? Neon
- ▶ Which gas is used as a protective atmosphere for growing silicon and germanium crystals? Argon
- ▶ Which gas when combined with hydrogen tends to make things wet, and we would die without it? Oxygen
- ▶ Materials for rainproof coats and tents owe their waterproof properties to surface tension
- ▶ Common cold is a Viral Disease
- ▶ Cytomegalovirus Infection is a Viral Disease
- ▶ Colorado tick fever is a Viral Disease
- ▶ Herpes simplex is a Viral Disease
- ▶ When a person can see nearer objects but not the distant ones he is said to be suffering from : nearsightedness (myopia)
- ▶ ATP is a molecule containing high energy bonds.
- ▶ An example of inorganic compound is carbon monoxide.
- ▶ Maximum duration of solar eclipse is 7 min 40 sec
- ▶ Millions of asteroids orbit the sun in the asteroid belt between Mars and Jupiter
- ▶ Ceres is the largest asteroid
- ▶ Corona is the outer most halo of the Sun.
- ▶ Comet is made of ice and dust
- ▶ Edmond Halley was the first to calculate the path of a comet and predict when it would be seen again.
- ▶ Taxidermy means stuffing dead animals
- ▶ Cytology is the study of cell
- ▶ Entomology is the study of insects.
- ▶ Apiculture is science of bee keeping
- ▶ Ornithology is the science of birds
- ▶ Philology is the science of languages
- ▶ Oncology is the study of cancer
- ▶ Exobiology is the study of life in outer space
- ▶ Numismatics is the study of coins
- ▶ Eugenics is the study of altering humans by changing their genes or it refers to Improvement of human race
- ▶ Anthropology is the study of origin and physical and cultural development of mankind



- ▶ Carpology is the study of fruits and seeds.
- ▶ -273 degree centigrade is called absolute zero temperature.
- ▶ Ambidextrous is one who can write with both hands.
- ▶ A etiology is the study of causes of disease.
- ▶ Conchology is the study of shells.
- ▶ The branch of zoology, which deals with the study of insects is called entomology
- ▶ The production of generally identical reproduction is called as Cloning
- ▶ A petrologist studies what- Rocks history formation etc
- ▶ The study of human population is called Demography.
- ▶ What does an otologist study-The ear and its diseases
- ▶ Noologists study what-The Mind
- ▶ Semiology is the study of what-Signals
- ▶ What is silviculture- Forestry
- ▶ What is Xylography- Wood Engraving
- ▶ Paleontology is the science of history of life.
- ▶ Meteorology is the study of study of weather.
- ▶ Cryptography is the study which deals with the secret writing.
- ▶ Hydroponics means cultivation of the plants without use of soil.
- ▶ Hyetology is the study of rainfall.
- ▶ The time period of a pendulum on moon increases.
- ▶ Clinical thermometer usually measures in Fahrenheit.
- ▶ Tube light emits radiation even after it is disconnected. It is due to Fluorescence.
- ▶ Shortsightedness can be corrected with the use of Concave.
- ▶ Rectifier converts AC into DC
- ▶ Atomic weight of chemical compounds is determined by Mass spectroscopy.
- ▶ Atomic pile is a place where nuclear fission is made.
- ▶ Dewar's flask is called as thermos.
- ▶ The conversion of gases into liquid under high pressure and low temperature is called regulation.
- ▶ If a green leaf is seen in a red light its color will be black.
- ▶ Mycology is the study of fungus and fungi diseases.
- ▶ Numismatics is the study of coins.
- ▶ Petrology is the study of rocks in the earth's crust.
- ▶ Amniocentesis is a method for determination of foetal sex.
- ▶ Agronomy is the science of soil management.
- ▶ Penology is the study, theory and practice of prison management & criminal rehabilitation.
- ▶ Chemical preservation of dead organisms in liquid is called Cryo-Biology.
- ▶ Orthoepy is the study of what-Word pronunciation
- ▶ What does a philologist study- Languages
- ▶ Chlamydomonas is unicellular plant
- ▶ Too much presence of the Potassium salt in human blood increase the risk of heart attack.
- ▶ The lack of calcium in the diet causes what condition-Rickets
- ▶ Celluloses are carbohydrates.
- ▶ Milk contains lactose.
- ▶ Ground nut has maximum protein
- ▶ Digestion of fat in intestine is aided by Emulsification
- ▶ Hair, finger nails, hoofs, etc are all



make of protein

- ▶ Deficiency of sodium and potassium causes muscular cramps, headache and diarrhoea
- ▶ Deficiency of Thiamine causes Beri Beri.
- ▶ Major component of honey is Glucose
- ▶ Main food nutrients are carbohydrates, protein, fat vitamins and minerals
- ▶ Meat is rich in iron we need to make blood cells
- ▶ Eating of coconut increases man's mental faculties
- ▶ Food poisoning can result from the eating of too much toadstools.
- ▶ Celluloses are carbohydrates.
- ▶ Milk contains lactose
- ▶ Ascorbic acid is essential for the formation of bones and teeth.
- ▶ Citric acid is a good substitution for ascorbic acid in our nutrition.
- ▶ Marie Curie twice won Noble Prize.
- ▶ The process by which plants take food is photosynthesis
- ▶ Reduction is the removal of oxygen atoms
- ▶ Father of botany is Theophrastus
- ▶ Father of biology is Aristotle
- ▶ James Hutton is called the father of modern geology.
- ▶ Theophrastus is called as father of botany.
- ▶ Dr. Christian Bernard was first to perform heart transplant in 1967 in Cape Town (SA)
- ▶ First man to receive artificial heart was Dr. Barney B. Clark
- ▶ Robert Hooke discovered Cell in 1665
- ▶ Aspirin discovered by Dreser
- ▶ Which organ of human body is affected by Tuberculosis? Lungs
- ▶ Pyorrhoea is a disease of the Gums
- ▶ Dr. Brain Josephson belonged to England.
- ▶ Dr. Brain Josephson is known for the discovery of the 'Josephson effect'.
- ▶ Over 100 pesticide ingredients are suspected to cause birth defects, cancer, and gene mutations.
- ▶ Every day 40,000 children die from preventable diseases.
- ▶ The human population of the world is expected to be nearly tripled by the year 2100.
- ▶ The Earth has been around for 4.6 billion years.
- ▶ In Peninsular Malaysia, more tree species are found in 125 acres of Tropical Forest than in the entire North America.
- ▶ Greater than a quarter of our rainforest is in Brazil.
- ▶ Penguins live only in the Southern Hemisphere and never in the Northern Hemisphere.
- ▶ The first open heart surgery was performed by Dr. Daniel Hall Williams in 1893.
- ▶ In 1967, the first successful heart transplant was performed in Cape Town, South Africa.
- ▶ The human brain has about 100 billion neurons.
- ▶ The cerebellum, a part of the brain, warns the rest of the brain that you are about to tickle yourself. Since your brain knows this, it ignores the resulting sensation.
- ▶ In America, the most common mental illness is Anxiety Disorders.
- ▶ Human brain is 80% water.
- ▶ The smallest bone in the human body is the stapes bone which is located in the ear.
- ▶ The human face is made up of 14



bones.

- ▶ Humans are born with 300 bones in their body, however when a person reaches adulthood they only have 206 bones. This occurs because many of them join together to make a single bone.
- ▶ Enamel is hardest substance in the human body.
- ▶ Adult human bones account for 14% of the body's total weight.
- ▶ Thigh bone is stronger than concrete.
- ▶ The strongest bone in your body is the femur (thighbone)
- ▶ The kidneys filter over 400 gallons of blood each day.
- ▶ The average life span of a single red blood cell is 120 days.
- ▶ Blood accounts for about 7 to 8% of a human's body weight.
- ▶ A woman has approximately 4.5 liters of blood in her body, while men have 5.6 liters.
- ▶ The study of the iris of the eye is called iridology.
- ▶ The eyeball of a human weighs approximately 28 grams.
- ▶ The eye of a human can distinguish 500 shades of the gray
- ▶ The cornea is the only living tissue in the human body that does not contain any blood vessels.
- ▶ The conjunctiva is a membrane that covers the human eye.
- ▶ All babies are colour blinds when they are born.
- ▶ A human eyeball weighs an ounce.
- ▶ The highest recorded speed of a sneeze is 165 km per hour.
- ▶ The space between your eyebrows is called the Glabella.
- ▶ Inside our eye, at the back, is a part called the "retina."
- ▶ On the retina are cells called "rods" and "cones." These rods and cones help us to see colors and light.
- ▶ Just behind the pupil is a lens. It is round and flat. It is thicker toward the middle.
- ▶ Over the front of our eye is a clear covering called the "conjunctiva"
- ▶ The white part of our eye is called the "sclera"
- ▶ At the front, the sclera becomes clear and is called the "cornea"
- ▶ Around the pupil is a colored muscle called the "iris"
- ▶ Our eyes may be BLUE, BROWN, GREEN, GRAY OR BLACK, because that is the color of the iris
- ▶ The fastest growing tissue in the human body is hair.
- ▶ Hair is made from the same substance as fingernails.
- ▶ Over 90% of diseases are caused or complicated by stress.
- ▶ The oldest known disease in the world is leprosy.
- ▶ A headache and inflammatory pain can be reduced by eating 20 tart cherries.
- ▶ Rocky Mountain spotted fever is a disease caused by ticks.
- ▶ Lack of sleep can affect your immune system and reduce your ability to fight infections.
- ▶ Carbon monoxide can kill a person in less than 15 minutes.
- ▶ It has been medically been proven that laughter is an effective pain killer.
- ▶ Influenza caused over twenty-one million deaths in 1918.
- ▶ A person infected with the SARS virus, has a 95-98% chance of recovery.
- ▶ The world's first test tube twins are Stephen and Amanda Mays born June 5, 1981.



- ▶ Mosquitoes do transmit diseases like Malaria.
- ▶ Throughout the world there are over 3,000 species of mosquitoes.
- ▶ Ozone is a blue gas with a relative molar mass of 48 and molecular formula of  $O_3$ .
- ▶ Nervous tissue vaccine (NTV) is one of the vaccines administered for dog bite.
- ▶ When warm wet air rises, it cools and water vapour condenses to form clouds. A cloud is made of small drops of water or ice crystals, depending on its height and how cold its surrounding air is. Most rain originates in nimbus or in towering cumulonimbus clouds.
- ▶ Oology is the study of Birds eggs
- ▶ Herpetology is the study of Reptiles
- ▶ Entomology is the study of Insects
- ▶ Ornithology is the study of Birds
- ▶ Ichthyology is the study of Fishes
- ▶ Osteology is the study of Bones
- ▶ The study of tissues is called Histology
- ▶ The science of organic forms and structures is known as Morphology
- ▶ Phycology is the study of Algae
- ▶ The first human being to land on moon was Neil Armstrong
- ▶ Central Tobacco Research Institute is located at Rajahmundry
- ▶ The first Indian Satellite was Aryabhata
- ▶ ASLV stands for Augmented Satellite Launch Vehicle
- ▶ The fear of women is known as Gynophobia
- ▶ The fear of men is known as Androphobia
- ▶ The scientist who developed the Quantum theory was Max Planck
- ▶ The botanical name of tea is Camellia Sinensis
- ▶ Zoology is the study of Animal life
- ▶ Botany is the study of Plant life
- ▶ What scale of zero to 14 is used to measure acidity or alkalinity? The pH scale
- ▶ Oxygen with molecules that have three atoms instead of two is Ozone
- ▶ What's removed from water in the process of desalination? Salt
- ▶ A substance that speeds a chemical reaction without being consumed is called Catalyst.
- ▶ What cooking fuel is produced by heating wood without oxygen? Charcoal
- ▶ Bats & humming birds belong to? Heterotherms
- ▶ Brown fat present in certain mammals is specialized in? Rapid heat production
- ▶ Blubber a thick layer of fat is present in? Marine Mammals
- ▶ Panting is a representative of which mechanism? Evaporative cooling
- ▶ Thermostat of human body is present in? Hypothalamus
- ▶ Production of pyrogens is a \_\_\_\_\_ phenomenon? Protective
- ▶ Name the type of adaptation from the following that is responsible for shivering thermogenesis? Behavioral
- ▶ The mechanism of regulation, generally between organism and its environment, of solutes and the gain and the loss of water is called? Osmoregulation
- ▶ In a hot summer after noon, if your body's Homeostatic machinery keep your internal temperature quite lower than that of external than this is an example of? Negative feed back
- ▶ In osmosis water molecules move from area of lower solute concentration to higher solute concentration through semipermeable membrane



- ▶ Which represents osmoregulatory steps taken by hydrophytes? Increases transpiration by increasing the surface area of the leave
- ▶ Thick, waxy & leathery cuticle around leaves is present in? Xerophytes
- ▶ Rose is an example of? Mesophytes
- ▶ Most of the marine invertebrates are? Osmoconformers
- ▶ Which of the following fish drink large amount of sea water and excrete concentrated urine resulting in maximum salt excretion and minimal water loss? Bony fishes
- ▶ Marine fish can keep their internal environment hypertonic with respect to the surrounding salty water by retaining? Trimethylamine oxide
- ▶ Epinasty is controlled by? Auxins
- ▶ Gibberellins is an example of? Growth stimulator
- ▶ Which of the following animal has a hydrostatic skeleton? Earthworm
- ▶ In an annelids, the contraction of circular muscle results in? Thinning of body
- ▶ Molluscs are surrounded by single or double pieces of hard skeleton.
- ▶ Shell of Molluscs grows as the animal grows.
- ▶ Molluscs have hydrostatic skeleton
- ▶ Which one of the following forms the blk of exoskeleton of an arthropod? Procuticle.
- ▶ Exoskeleton of a marine snail is composed of?  $\text{CaCO}_3$
- ▶ Arthropod exoskeleton permits gaseous exchange
- ▶ Arthropod exoskeleton provides muscle attachment
- ▶ Like all the other types of exoskeleton, arthropod exoskeleton lack sensation.
- ▶ What is Ecdysone? A hormone that regulates moulting in arthropods
- ▶ Endoskeleton is secreted by? Mesoderm
- ▶ Collagen fibers of bone are hardened by deposition of?  $\text{Ca}$  &  $\text{PO}_4$
- ▶ Which one of the following is avascular structure? Cartilage
- ▶ Which of the following bone is not present in the hind-limb? Radius
- ▶ How many bones are present in the wrist? 8 bones
- ▶ Which of the following bones are present in the plam of hand? Metacarpals
- ▶ How many vertebrae are present in vertebral column of man? 33 vertebrae
- ▶ How many vertebrae are present in coccyx? 4
- ▶ How many vertebrae are present in the neck or cervical region of man? 7
- ▶ How many vertebrae are present in thoracic region? 12
- ▶ How many vertebrae are in sacrum? 5
- ▶ How many vertebrae are present in lumbar region? 5
- ▶ Which of the following bones are present in pectoral girdle? Clavicle & Scapula
- ▶ A joint formed between humerus, radius and ulna is an example of? Freely movable joint
- ▶ Joint between two parietal bones, which is infact immovable one is an example of? Fibrous joints
- ▶ Fibrous capsule surrounding synovial joints may be thickened at some places to form? Ligaments
- ▶ In which of the following joint muscles are arranged in the same plane as that of joint? Between femur and tibia
- ▶ Which of the following hormone is predominantly responsible for bone weakening in older women? Oestrogen.
- ▶ Which of the follwing is a childhood disease resulting from nutritive  $\text{Ca}^{2+}$



deficiency? Rickets

- ▶ If two ends of fractured bone are opened and kept united via screws and wires drilled in bone substance. This step in fracture repair is called? Open reduction
- ▶ A fracture hematoma has? Dead cells
- ▶ Which of the following cells are involved in soft callus formation? Fibroblast and osteoblast
- ▶ Bony callus formation completes in? 2-3 months
- ▶ Which of the following is a uni-nucleated cell? A smooth muscle cell
- ▶ The contraction of which of the following muscle fibers, is controlled by hormones? A smooth muscle
- ▶ Why skeletal muscles are called striated muscles? Alternating dark and light bands appear on their surface when visualized via a microscope.
- ▶ A smallest contractile unit of muscle contraction called sarcomere is the area between two? Z- Line
- ▶ Diameter of thick filament is? 16nm
- ▶ If a cross section of a sarcomere is seen, each myosin is surrounded by how many actin molecules? 6
- ▶ What happens during muscle contraction to the length of each myosin and action filament? Z- lines get closer
- ▶ Which of the following step occurs immediately after binding of  $\text{Ca}^{2+}$  with troponin molecule during muscle contraction? Tropomyosin gets removed from the binding sites of actin filaments.
- ▶ Rigor mortis i.e, stiffening of body after death results from? Unavailability of ATP, which is necessary to break the link between actin and myosin
- ▶ The major event in fatigue is accumulation of lactic acid.
- ▶ Lactic acid accumulation turns pH in acidic range leading to muscle ache in fatigue
- ▶ Ionic imbalance may also cause fatigue
- ▶ Tetany is caused by? Hypocalcemia
- ▶ Which one of the following is an example of a non-elastic connective tissue? Tendon
- ▶ Which of the following muscle is an antagonistic member of Biceps brachii? Triceps
- ▶ Insertion of Biceps is on? Radius
- ▶ Which of the following animal uses Setae and Muscles for their locomotion? Earthworm
- ▶ Which of the following vertebrates have a fish-like body? Amphibians
- ▶ Which of the following pairs of fins in a fish body are paired? Pectoral and Pelvic.
- ▶ Among the following organisms which shows the best adaptations for locomotion? Reptiles
- ▶ Which of the following is the swiftest form of the locomotion? Unguligrade
- ▶ S-band locomotion is characteristically seen in? Cartilaginous fish
- ▶ In asexual reproduction offspring are produced by? Mitosis
- ▶ Gametes in animals are produced by? Mitosis
- ▶ In sexual reproduction, plants have diplohaplontic life cycle with alternating? Diploid sporophyte and haploid gametophyte generations
- ▶ In heteromorphic generations are vegetatively dissimilar
- ▶ In isomorphic generations are vegetatively similar
- ▶ In parthenocarpy which levels are high in ovaries? Auxins
- ▶ Climacteric is burst of respiratory activity in fruit ripening
- ▶ Climacteric is associated with ethane production



- ▶ Climacteric helps in fruit ripening
- ▶ What is critical in photoperiodism?  
Length of dark period
- ▶ Which one is not a day neutral plant?  
Tobacco
- ▶ In short day plants red light prevents flowering
- ▶ In long day plants for red light promotes flowering
- ▶ Leaf unrolling occurs in grasses
- ▶ In biennials and perennials, low temperature stimulus is not received by? Leaves of the plants
- ▶ Development of an egg into zygote without fertilization is called? Parthenogenesis
- ▶ In which organism males are haploid?  
Honey bee
- ▶ In cloning, nucleus is introduced into? Egg cell
- ▶ Which characteristic is not of identical twins? Have different genetic makeup
- ▶ Viviparous animals are those in which? Internal fertilization with internal development inside female body
- ▶ Example of ovoviviparous? Duckbill platypus
- ▶ 2nd meiotic division in oocyte is completed? When oocyte is fertilized by sperm
- ▶ Fertilization of ovum occurs? In proximal part of oviduct
- ▶ Duration of menstrual cycle is? 28 days
- ▶ Progesterone is secreted by? Corpus luteum
- ▶ Total gestation period is about? 280 days
- ▶ Fetus is human embryo from the beginning of? 3rd month
- ▶ Average loss of blood during birth is about? 350 cm<sup>3</sup>
- ▶ Syphilis is caused by Treponema
- ▶ Genital herpes produces genital soreness and ulcers
- ▶ Syphilis affects eyes, bones, joints, CNS
- ▶ The animals in which there are separate male and female individuals are called? Unisexual
- ▶ In which of the following animals, placenta is formed? Eutherians
- ▶ Which of these cycles operate in human females? Menstrual cycle
- ▶ A specialized nerve cell that synthesizes and releases hormones is called Neurosecretory cell.
- ▶ A chemical that is released by a nerve cell close to a second nerve cell, a muscle, or a gland cell and that influences the activity of the second cell is called Neurotransmitter.
- ▶ The resources that an organism exploits to meet its energy, nutrient, and survival demands is called Niche.
- ▶ One of the three codons (UAA, UAG, UGA) that are not recognized by tRNAs, thus serving as "stop" signals in the mRNA message and terminating translation is called Nonsense codon.
- ▶ The fundamental packaging unit of eukaryotic chromosome; a complex of DNA and histone proteins in which the double helical DNA winds around eight molecules of histone; chromatin is composed of long sequences of nucleosomes is called Nucleosome.
- ▶ A single unit of nucleic acid, composed of a phosphate, a five carbon sugar (either ribose or deoxyribose) and a nitrogenous base (purine or a pyrimidine) is called Nucleotide.
- ▶ A gamete without any sex chromosome is called Null.
- ▶ A hormone, released by the posterior pituitary, that stimulates the contraction uterine and mammary gland muscles is called Oxytocin.
- ▶ Study of early life forms on earth is



called Palaeontology.

- ▶ Nucleotide sequence that is identical to its complementary strand when each is read in the same chemical direction is called Palindromic sequence—for example GATC, i.e., 5' .... GATC... 3', 3'.... CTAG....
- ▶ The division of the autonomic nervous system that produces largely involuntary responses related to the maintenance of normal body functions, such as digestion is called Parasympathetic division.
- ▶ A hormone, secreted by the parathyroid gland, that stimulates the release of calcium from bones is called Parathormone.
- ▶ The vascular tissue that conducts organic solutes in plants; it contains sieve-tube cells and companion cells is called Phloem.
- ▶ This bond links nucleotides in nucleic acid. A nucleic acid is formed when the phosphate group of one nucleotide binds to the 3' hydroxyl group of the sugar of another is called Phosphodiester bond.
- ▶ A molecule having the same structure as a neutral fat, except that one bonded fatty acid is replaced by a group that contains phosphate; an important component of plasma membrane is called Phospholipid.
- ▶ Response of an organism to the relative duration of day and night is called Photoperiodism.
- ▶ An extra – chromosomal DNA, usually circular, that replicates independently of the main chromosome, although it may have been derived from it is called Plasmid.
- ▶ Ticker cytoplasm just beneath the plasma membrane is called Plasmagel.
- ▶ Alleles of two or more gene pairs at different loci influencing the same trait in an additive way is called Pleiotropy.
- ▶ A process by which DNA polymerase is used to copy a sequence of interest repeatedly, making millions of copies of the same DNA is called Polymerase chain reaction (PCR).
- ▶ Study of genetic events in a gene pool is called Population genetics.
- ▶ Chance of an event to occur is called Probability.
- ▶ A hormone, produced by the corpus luteum, that promotes the development of the uterine lining in females is called Progesterone.
- ▶ A bacterium, a cell lacking a membrane-bound nucleus or membrane bounded organelle. Single celled organism that has no membrane-bound nucleus or other membrane enclosed organelles i.e., bacteria; found only in kingdom Monera is called Prokaryote.
- ▶ A hormone, released by the anterior [pituitary, that stimulates milk production in human females and other mammals is called Prolactin.
- ▶ A specific nucleotide sequence on the DNA molecule to which RNA polymerase attaches to initiate transcription of mRNA from a gene is called Promoter.
- ▶ An early stage in nuclear division characterized by the formation of microtubule spindle along the future axis of division, the shortening and thickening of the chromosomes and their movement toward the equator of the spindle, before they are attached to the spindle fibres is called Prophase.
- ▶ Fragments of DNA from two different species such as bacterium and mammal spliced together in the laboratory into a single molecule is called Recombinant DNA.
- ▶ The outer layer of the kidney, where nephrons are located is called Renal cortex.
- ▶ The layer of the kidney just inside the renal cortex; where loops of Henle produce a highly concentrated interstitial fluid, important in the



production of concentrated urine is called Renal medulla.

- ▶ A y-shaped end of a growing replication bubble in DNA molecule undergoing replication is called Replication fork.
- ▶ An enzyme that cleaves a DNA duplex molecule at a particular base sequence, usually within or near a palindromic sequence; also called restriction enzyme is called Restriction endonuclease.
- ▶ Restriction enzymes recognize very specific DNA sequences is called RFLP (restriction fragment length polymorphism).
- ▶ Alleles of the same gene or surrounding sequence may have base pair differences so that DNA near one allele is cut into a different length fragment than DNA near the other allele. These different fragments separate bases on size on gels.
- ▶ RNA polymerase: An enzyme that catalyzes the assembly of an mRNA molecule, sequence of which is complementary to a DNA molecule used as a template.
- ▶ In DNA replication a sequence of about 10 RNA nucleotides complementary to unwound DNA that attaches at a replication fork is called RNA primer
- ▶ The DNA polymerase uses the RNA primer as a starting point for addition of DNA nucleotides to form the new DNA strand
- ▶ The RNA primer is later removed and replaced by DNA nucleotides.
- ▶ Sarcoplasm: The cytoplasm of the muscle cell that contains large amount of stored glycogen and myoglobin.
- ▶ Satellite DNA is a non transcribed region of chromosome with a distinctive base composition, a short nucleotide sequence repeated many thousands of time.
- ▶ The main supporting tissue in plants, made up of cells with heavily thickened walls and empty lumen is called Sclerenchyma

- ▶ Enlarged lining epithelium cells connected with groups of developing spermatozoa in tests is called Sertoli cells (spermatoblasts).
- ▶ Any of the cells of a multicellular organism, except those that are destined to form gametes is called Somatic cell.
- ▶ A change in genetic information occurring in one of the somatic cells of a multicellular organism not passed from one generation to the next is called Somatic mutation.
- ▶ Commonly called "pulled muscle", a strain in excess stretching and possible tearing of muscle due to over use or abuse is called Spasm.
- ▶ A helical bacterium which is flexible and has periplasmic flagella is called Spirochete.
- ▶ Relatively undifferentiated cell that can continue dividing indefinitely, throwing off daughter cells that can undergo terminal differentiation into particular cell types is called Stem cell.
- ▶ A class of hormone whose chemical structure (four fused carbon rings with various functional groups) resemble cholesterol; steroids, which are lipids, are secreted by the ovaries and placenta, the testes, and the adrenal cortex is called Steroid hormone.
- ▶ The biological association of two individuals or populations of different species is called Symbiosis.
- ▶ The site of communication between nerve cells is called Synapse.
- ▶ At a synapse, one (presynaptic) cell normally releases a chemical (the neurotransmitter) that changes the electrical potential of the second (postsynaptic) cell.
- ▶ A tiny space that separates the presynaptic and postsynaptic neurons is called Synaptic cleft.
- ▶ The point in which articulating bones are separated by a fluid containing joint cavity is called Synovial joint.



- ▶ An innate behavior that is a directed movement of an organism towards or away from a stimulus such as heat, light, or gravity is called Taxis.
- ▶ The description of species and classification of organisms into groups that reflect evolutionary relationships is called Taxonomy.
- ▶ A specialized non-transcribed structure that caps each end of the chromosome is called Telomere.
- ▶ A type of fibrous connective tissue that attaches muscle to bone is called Tendon.
- ▶ An endocrine gland, located in front of the larynx in the neck, that secretes the hormone thyroxine (affecting metabolic rates) and calcitonin (regulating calcium ion concentration in the blood) is called Thyroid gland.
- ▶ One of a set of proteins required for RNA polymerase to bind to a eukaryotic promoter region, become stabilized and begin the transcription process is called Transcription factor.
- ▶ Introduction of a foreign DNA molecule into a eukaryotic cell. It is usually followed by expression of one or more genes in the newly introduced DNA is called Transfection.
- ▶ Free living organisms in the environment that have had a foreign gene stably inserted into them. This gene can be passed on to successive generations is called Transgenic organism.
- ▶ A DNA sequence capable of moving from one site in the DNA sequence to another, apparently random is called Transposon.
- ▶ Rod-shaped protein spiral about the F-actin core which helps to stiffen it is called Tropomyosin.
- ▶ In cell biology, the DNA of an agent (virus or plasmid) used to transmit genetic material to a cell or organism is called Vector.
- ▶ Visible evidence of structure that was present in an earlier stage in the evolution of an organism. One of the sources of evidence for evolution is called Vestigial organ.
- ▶ A normal gene or individual found in a natural population is called Wild type.
- ▶ A rapid change from a negative to a positive electrical potential in a nerve cell is called Action potential. The signal travels along an axon without a change in intensity.
- ▶ Clumping of RBC is called Agglutination.
- ▶ Partner of a gene pair occupying the same gene locus is called Allele.
- ▶ Alzheimer's disease is a mental deterioration; usually strikes late in life.
- ▶ Part of the forebrain of vertebrates that is involved in the production of appropriate behavioral responses to environmental stimuli is called Amygdala.
- ▶ Biruni has also been described as "the first anthropologist" and the "father of geodesy".
- ▶ Al-Biruni was born in Khwarazm presently in Khiva, Uzbekistan. He studied mathematics and astronomy under Abu Nasr Mansur.
- ▶ Al-Biruni was a colleague of the fellow Persian Muslim philosopher and physician Ibn Sina
- ▶ Al-Biruni wrote his Ta'rikh al-Hind ("Chronicles of India"). Biruni wrote his books in Arabic and his native language Persian, though he knew no less than four other languages: Greek, Sanskrit, Syriac and possibly Berber.
- ▶ Al-Farisi was a pupil of the great astronomer and mathematician Qutb al-Din al-Shirazi, who in turn was a pupil of Nasir al-Din Tusi
- ▶ Abu-I-Hasan Ahmad ibn Mohammad al-Tabari, was a 10th century Persian physician from Tabaristan.
- ▶ Al-Tabari was author of a compendium



of medicine Kitab al-mu'alaja al-buqratiya (Hippocratic treatments), in ten books. It is extant only in Arabic.

- ▶ Abu al-Hasan Ali ibn Sahl Rabban al-Tabari was a Persian scholar physician (a hakim), who produced the first encyclopedia of medicine. His famous pupil, Zakariya al-Razi ("Razi"), has eclipsed his stature.
- ▶ Abu al-Qasim Khalaf ibn al-Abbas Al-Zahrawi (936 - 1013) also known in the West as Abulcasis, was an Andalusian-Arab physician, and scientist.
- ▶ His greatest contribution to history is Al-Tasrif, a thirty-volume collection of medical practice.
- ▶ Abu al-Qasim was born in the city of El Zahra, six miles northwest of Cordoba, Spain.
- ▶ Abu al-Qasim was a court physician to the Andalusian caliph Al-Hakam II.
- ▶ Best work of Abu al-Qasim was Al-Tasrif. It is a medical encyclopedia spanning 30 volumes which included sections on surgery, medicine, orthopaedics, ophthalmology, pharmacology, nutrition etc.
- ▶ Al-Tasrif was later translated into Latin by Gerard of Cremona in the 12th century, and illustrated.
- ▶ Al-Qasim was a surgeon and specialized in curing disease by cauterization.
- ▶ Al-Qasim also invented several devices used during surgery, for the purpose of inspection of the interior of the urethra, applying and removing foreign bodies from the throat and inspection of the ear.
- ▶ Ibn-Sina was a court physician in Persia, and wrote two of history's greatest works, The Book of Healing, a compendium of science and philosophy,
- ▶ Ibn-Sina wrote the Canon of Medicine, an encyclopedia based on the teachings of Greek physicians.
- ▶ The Canon of Medicine was widely

used in the West, where Ibn-Sina, known as Avicenna, was called the "prince of physicians."

- ▶ The sultan of Bukhara appointed Avicenna as one of his physicians, who then had access to the sultan's vast library.
- ▶ Aben Sina was only 21 when he composed his Kitab al-Majmu or, The Book of the Sum Total, whose mysteries he afterward attempted to clarify in a 20-volume commentary.
- ▶ Ibn Sina also known as Avicenna was a Persian physician, philosopher, and scientist.
- ▶ Avicenna was born around 980 (370 AH) in Afshana near Bukhara in Khorasan (now part of Uzbekistan) and died in 1037 (428 AH) in Hamadan (Iran).
- ▶ Ibn Sina authored some 450 books on a wide range of subjects, many of which concentrated on philosophy and medicine.
- ▶ Most famous works of Ibn Sina are The Book of Healing and The Canon of Medicine, which was for almost five centuries a standard medical text at many European universities.
- ▶ Avicenna's medical system was based on that of Galen which he combined with Aristotelian metaphysics as well as traditional Persian and Arab lore.
- ▶ George Sarton called Avicenna "the most famous scientist of Islam and one of the most famous of all races, places, and times."
- ▶ Bu-Ali Sina University in Hamedan (Iran) and Tajik State Medical University in Dushanbe (The capital of the Republic of Tajikistan) bear Avicenna's name.
- ▶ Ibn al-Nafis was an Arab physician who is mostly famous for being the first to describe the pulmonary circulation of the blood.
- ▶ What is the average weight of Human brain? 1,400 grams



- ▶ Ibn al-Nafis was born in 1213 in Damascus. He attended the Medical College Hospital (Bimaristan Al-Noori) in Damascus.
- ▶ Apart from medicine, Ibn al-Nafis learned jurisprudence, literature and theology. He became an expert on the Shafi'i school of jurisprudence and an expert physician.
- ▶ In 1236, Al-Nafis moved to Egypt. He worked at the Al-Nassri Hospital, and subsequently at the Al-Mansouri Hospital, where he became chief of physicians and the Sultan's personal physician.
- ▶ The most voluminous of his books is Al-Shamil fi al-Tibb, which was planned to be an encyclopedia comprising 300 volumes, but was not completed as a result of his death.
- ▶ Averroes, also known simply as 'The Commentator' to the Latin West, or Ibn Rushd, came from a family of jurists and was born in Cordoba in Moorish Spain.
- ▶ Ibn Rushd himself trained in law and medicine and later served as qadi or judge in Seville and Cordoba.
- ▶ In 1182 Ibn Rushd was appointed physician to the court of caliph Abu Yaqub Yusuf in Marrakesh and to his son, Abu Yusuf Yaqub, in 1195 but was recalled shortly before his death.
- ▶ In the field of medicine Averroes produced his Kulliyat fi al tib (General Medicine) between 1162 and 1169.
- ▶ Crescograph is used for measuring growth in plants.
- ▶ Paleontology is the study of life-forms existing in former geological time periods
- ▶ Physiology is the study of the mechanical, physical, and biochemical functions of living organisms
- ▶ Radiology is the branch of medicine dealing with the applications of radiant energy, including x-rays and radioisotopes
- ▶ Taxonomy is the science of classification of animals and plants
- ▶ Zoology is the study of animals
- ▶ Algae are Flowerless plants living mostly in water possessing chlorophyll.
- ▶ Angiosperm are Flowering plants with seeds enclosed inside fruits.
- ▶ Chlorophyll is a green pigment in green plants which absorbs sunlight and builds up sugar.
- ▶ Cryptogams are Flowerless plants.
- ▶ Epiphytes: A plant that grows upon another plant, also a vegetable derives nourishment from it. Parasite
- ▶ Flora: is the whole assemblage of the plant life of a region.
- ▶ Fungi are simple plants with chlorophyll.
- ▶ Gymnosperms are plants with naked seeds, i.e., seeds not enclosed in fruits.
- ▶ Decaying plant and other organic matter in the soil is called Humus
- ▶ Hydroponics is the system of growing plants through water culture methods.
- ▶ Hydrotropism is the response of plant organism to moisture or water.
- ▶ Parasite: An organism which derives its nourishment from another living organism.
- ▶ Perennial: A plant that lives for more than two years.
- ▶ Photosynthesis: A process in green plants by which it synthesises carbohydrates; food is manufactured from carbon dioxide and water releases oxygen from sunlight.
- ▶ Phototropism is the automatic response of plant organisms to light.
- ▶ Pollination: The process of transference of pollen to stigma of flowers.
- ▶ Protoplasm is the living matter of which organisms are formed.
- ▶ Rust: A disease caused by fungus in wheat plant a parasitic fungus affecting



plants.

- ▶ Saprophyte: An organism living on dead and decaying organic matter.
- ▶ Smut is a disease found in the cereals. It is caused by fungus.
- ▶ Thallophyte: A group of plants having simple plant body without root, stem and leaves (algae, fungi, etc).
- ▶ Antibiotics refers to any drug, derived from organisms, with a specific action against bacteria. Penicillin, derived from a fungus, serves as an example.
- ▶ Anthropods: A group of invertebrate animals which have segmented body and joined limbs (mosquito, fly, spider, etc.).
- ▶ Aves: A group of vertebrate animals including flying and non-flying birds.
- ▶ Chordate refers to the major division of animal kingdom which includes man and all mammals, birds, amphibia, reptiles and fishes.
- ▶ Hibernation is the period of dormancy in winter occurring in some mammals and in most reptiles and amphibians in colder parts of the world.
- ▶ Mammal: Group of animals which include back-boned hairy animals sucking its young.
- ▶ Mollusca: Animals having a soft, unsegmented, body usually covered with a hard. shell (snails, mussels etc).
- ▶ Mutation is the discontinuous variation or sudden inheritable divergence of characteristics from ancestral type.
- ▶ Pisces: A group of vertebrates living in water including fishes e.g., lamprey, sea-horse, shark etc.
- ▶ Protozoa: Animals of microscopic size, they are mostly unicellular animals like trypanosoma, entamoeba, etc.
- ▶ Reptiles: A group of vertebrate animals which creep or crawl (snake, lizard, alligator, etc.)
- ▶ Cardiogram is a medical instrument used for tracing the movements of the heart.
- ▶ Cardiograph is a medical instrument for tracing heart movements.
- ▶ Neurology: the branch of medicine dealing with the nervous system and its disorders
- ▶ Organic Chemistry is a branch of chemistry dedicated to the study of the structures, synthesis, and reactions of carbon-containing compounds
- ▶ Ornithology is the study of birds
- ▶ During birth which of following act as birth canal? Vagina
- ▶ Nutrition to egg in ovary is provided by? Follicle cells
- ▶ End of menstrual cycle in old age is called? Menopause
- ▶ Critical day length for cocklebur is? 15.5 hrs
- ▶ Evolution of pollen tube is parallel to the evolution of? Seed
- ▶ Resumption of normal growth by a dormant embryo is called? Germination
- ▶ \_\_\_\_\_ is a quiescent form of phytochrome.? P660
- ▶ Apomixis is a form of? Parthenogenesis
- ▶ Growth process is? Irreversible
- ▶ A plant has a growth pattern called Open growth
- ▶ Speed of growth is? First rapid then slow
- ▶ Meristems are group of cells that? Retain the potential to divide
- ▶ Higher plants grow through? Growing points
- ▶ Meristems are of? Three types
- ▶ Apical meristems are located at? Tips of roots and stems
- ▶ Function of intercalary meristems is? Production of leaves and flowers
- ▶ Lateral meristems are present in?



## Gymnosperms and dicots

- ▶ Intercalary meristems are of? Temporary nature
- ▶ Determinate growth is? Vegetative roots and shoots grow by
- ▶ In plants growth is of? Two types
- ▶ Secondary growth is actually? Increase in thickness
- ▶ Cambium are examples of? Lateral meristems
- ▶ Growth of multicellular plants occur in? Four phases
- ▶ In multicellular plants cell division occur by? Mitosis
- ▶ Cells elongate by? Uptake of water
- ▶ Plasticity of cell wall increases during? Cell elongation
- ▶ Cells of fibers and tracheids elongate during? Phase of cell division
- ▶ During cell differentiation walls of cells become thick
- ▶ Maximum optimum temperature for growth of plants is? 25-30 degree C
- ▶ Red light favours elongation of cells
- ▶ Blue light retards cell enlargement
- ▶ UV rays retards cell elongation
- ▶ Light duration plays a role in inducing or suppressing flowering, phenomenon is called? Photoperiodism
- ▶ Root primordial develop from? Pericycle
- ▶ Growth of apical buds suppressing lower axillary buds is? Apical dominance
- ▶ In chicks fertilization is? Internal
- ▶ Incubation temperature for chick is? 36-38 degree C
- ▶ After providing 36-38°C temperature, chick's egg is hatched on? 21st days
- ▶ Epiblast is presumptive ectoderm and mesoderm
- ▶ Hypoblast is presumptive endoderm
- ▶ Upper layer of cells in blastoderm is epiblast
- ▶ Peripheral part of blastoderm making contact with yolk is called? Area opaca
- ▶ Cavity formed between somatic and splanchnic mesoderm is called? Coelom
- ▶ Fertilized egg of an ascidian contains cytoplasm of four colours
- ▶ Grey equatorial cytoplasm gives rise to notochord
- ▶ Grey vegetal cytoplasm gives rise to gut
- ▶ Acetabularia crenulata has? Irregular shaped cap
- ▶ Mesodermal cells stimulate ectodermal cells to form nervous system
- ▶ Negative physiological changes in our body is called? Aging
- ▶ Study of aging is gerontology
- ▶ The ability to regain or recover the lost or injured part of body is? Regeneration
- ▶ Among invertebrates who possess great power of regeneration? Sponges
- ▶ Earthworm can regenerate its head
- ▶ Salamander can regenerate its limbs
- ▶ Man can regenerate his skin
- ▶ The stage of rapid cell division just after fertilization is? Cleavage
- ▶ The German scientist Spemann worked on differentiation in? 1924
- ▶ Inducer substances are produced by? Notochord
- ▶ What is the feature of cells in gastrulation? Migration
- ▶ Vertebral column is formed from? Mesoderm
- ▶ Liver and pancreas arise from? Foregut
- ▶ Hemophilia is? Excessive bleeding due to defective gene on sex chromosome
- ▶ Chromosomes 1st observed by walther Fleming



- ▶ Chromosomal theory of inheritance 1st formulated by Walter Sutton
- ▶ Sex chromosomes discovered by Thomas Hunt Morgan
- ▶ Chromosome is made of 1 chromatid + 1 centromere + primary constriction\*
- ▶ Chromosomes are composed of? 60% protein and 40% DNA
- ▶ A typical human chromosome contains \_\_\_\_\_ nucleotides in its DNA? 140 million
- ▶ What energy unit is defined as the heat required to raise one kilogram of water by one degree Celsius? One Calorie
- ▶ What continent is subjected to the world's largest ozone hole? Antarctica
- ▶ What sea creature can have an eye measuring 16 inches across, the largest in the animal kingdom? A squid
- ▶ What were exterminated from Harvard's bio labs when they were found to be carrying radioactive chemicals into the walls? Ants
- ▶ What type of trees yield the resin used to produce turpentine? Pine trees
- ▶ What butterfly-shaped gland is located just in front of the windpipe? The Thyroid
- ▶ Viscosity is defined as "the ability of a liquid to resist flowing."
- ▶ What organ of the body leads all others with 3,195 distinct genes? The brain
- ▶ What's the common name for the eye inflammation doctors call conjunctivitis? Pink eye
- ▶ What name for a bone disease translates as "porous bone"? Osteoporosis
- ▶ What earthenware ceramic was produced in ancient China from feldspar and china clay? Porcelain
- ▶ What Greek was the first physician to record case histories of patients? Hippocrates
- ▶ What name for an automaton came from the Czech word meaning "forced labor"? Robot
- ▶ What colorless gas is essential in the production of fertilizers and light bulbs? Nitrogen
- ▶ What did Dr. Heinrich Dreser hype as a non addictive substitute for morphine in 1898? Heroin
- ▶ What did the Nimbus-7 satellite monitor changes in the depth of? The ozone layer
- ▶ What was the short word for "Infantile Paralysis"? Polio
- ▶ What's the most common automotive essential that is measured in terms of its viscosity? Oil
- ▶ What did 18th-century chemist Antoine Lavoisier prove was a compound of hydrogen and oxygen? Water
- ▶ What objects are studied in what enthusiasts call "ufology"? Unidentified flying objects
- ▶ What's the most common contributor to chronic bronchitis? Smoking
- ▶ What's the study of materials at very low temperatures? Cryogenics
- ▶ What procedure is performed on an abscess if the dentist thinks the tooth can be saved? Root canal
- ▶ What Greek advised: "Let your food be your medicine, and your medicine by your food"? Hippocrates
- ▶ What does an anthropophagic census-taker fear? People
- ▶ What are you forbidden to do in a "snuff zone"? Smoke
- ▶ What cartoonist has had three insect species named after him? Gary Larson
- ▶ What word denotes the residue of combustion or incineration? Ash
- ▶ What time period is sandwiched between the Cretaceous and Triassic?



▶ Unsaturated triglyceride molecules are those in which there are double or triple bonds between carbon atoms and, as a result, they are less hydrogenated than the saturated ones.

▶ In general, these unsaturated triglyceride molecules are oils, and are liquid at room temperature.

▶ Triglycerides are poor heat conductors and, in addition, they form thick layers of fatty tissue when accumulated in an organism. That is why they are good thermal insulators.

▶ In animals that live in cold climates, such as polar bears, seals and whales, adipose tissue helps the maintenance of internal body temperature.

▶ Carbohydrates are the main energy source for aerobic cell respiration. When such substances are absent or deficient, the body can use lipid stores since fats (like proteins) can be broken down into acetyl-CoA to feed the Krebs cycle (a stage of aerobic cellular respiration).

▶ Proteins are molecules made up of sequences of amino acids bound by a peptide bond.

▶ The genetic code specifies twenty different amino acids that can compose proteins.

▶ There are numerous combinations of amino acids that can form polypeptide chains, and for this reason, protein molecules can be hugely diverse.

▶ Proteins play a fundamental role in nearly all biological processes. Due to their diversity, they can take on many different configurations and can play varied roles in cells and tissues.

▶ The units that make up proteins are amino acids.

▶ What is an oligopeptide? The peptide molecule is the molecule formed by the bonding of amino acids through the peptide bond.

▶ An oligopeptide is a peptide composed of few amino acids (oligo = few).

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Polypeptides are peptides that contain many amino acids (poli = many), in general more than 50.

▶ There are twenty different known amino acids that form proteins related to the genetic code of the living organisms.

▶ A carboxyl group  $\text{-COOH}$ , an amine group  $\text{-NH}_2$ , an hydrogen atom  $\text{-H}$  and a variable radical  $\text{-R}$  are necessarily bound to the central carbon atom of an amino acid.

▶ Carboxyl groups ( $\text{-COOH}$ ) have one carbon atom attached to one hydroxyl group through a simple bond and to one oxygen atom via a double bond. The carbon atom's other bond site is available to other substances.

▶ An amino acid molecule has a central carbon atom to which a carboxyl group is bound on one side and to which a  $\text{-R}$  (variable radical) is bound on the opposite side.

▶ The bond between the carboxyl group and a carbon atom in which a hydrogen atom is laterally attached is the reason for the name "acid" in amino acids. The bond between an amine group and the central carbon gives the name "amino."

▶ The  $\text{-R}$  group, also called a side-chain, is the variable part of the amino acid molecule.

▶ The  $\text{-R}$  group can be a complex chain of carbon atoms, a substitute methyl group (in this case forming the amino acid alanine) or even a sole hydrogen atom (forming glycine, the simplest amino acid).

▶ Therefore the  $\text{-R}$  group is important because it is what distinguishes the different amino acids.

▶ A peptide is formed when a carbon atom from the carboxyl group of one amino acid is connected to the nitrogen atom of the amine group of another amino acid.

▶ Through that bond, the hydroxyl group



## The Jurassic

- ▶ What colorless, odorless substance is the main constituent of natural gas?  
Methane
- ▶ What term for "bipolar disorder" has fallen out of general use? Manic depression
- ▶ Nebula describes a cloud of dust and gas in space
- ▶ What organ was operated on in the first microsurgical procedure, in 1921?  
The ear
- ▶ The main types of lipids are triglycerides (fats and oils), phospholipids, waxes and steroids.
- ▶ Glycerol is a linear chain of three carbon atoms; the central carbon atom is bound to one hydroxyl radical and to one hydrogen atom and the two other carbon atoms at the ends are bound to a hydroxyl radical and to two hydrogen atoms. Spatial position side of the hydroxyl radicals is the same.
- ▶ Triglycerides, which are fats or oils, are made up of three molecules of fatty acids bound to one molecule of glycerol.
- ▶ Hydroxyls of each one of the three fatty acids and each hydrogen atom of the hydroxyls of the glycerol bind to form three molecules of water that are released.
- ▶ Phospholipids are molecules made up of one molecule of glycerol bound to two long molecules of fatty acids and to one phosphate group.
- ▶ Phospholipids are amphipathic molecules, meaning that they have a non-polar portion, due to the long fatty acid chains, and a polar portion, due to the phosphate group.
- ▶ Phospholipids are the main component of cell membranes. Sphingomyelin, the substance that forms the myelin sheath of axons in the nervous system, is a phospholipid.
- ▶ Steroids are lipids that consist of an angular combination of four carbon rings, three of which are made of six carbon atoms and one of which, located at the end, made of five carbon atoms in the extremity.
- ▶ Bile salts, cholesterol, the sexual hormones estrogen, progesterone and testosterone, corticosteroids and pro-vitamin D are examples of steroids.
- ▶ Hydrophobic molecules are molecules with little or no propensity to dissolve in water (hydro = water, phobia = fear).
- ▶ Hydrophilic molecules are those that have a large propensity to dissolve in water (philia = friendship).
- ▶ Water is a polar substance. Remembering the rule that "equal dissolves equal", it is easy to conclude that hydrophobic substances are non-polar molecules whereas hydrophilic molecules are polar molecules.
- ▶ Benzene and ethers are molecules without electrically charged portions and therefore are non-polar substances.
- ▶ Fats and oils are hydrophobic molecules, meaning that they are non-polar and insoluble in water.
- ▶ Lipids in general are molecules with a large non-polar extension, making them soluble in non-polar solvents, such as benzene, ether and chloroform.
- ▶ There exist some amphipathic lipids, which are lipids with both a hydrophilic portion, which gives them the property of water-solubility, as well as a hydrophobic portion, which is non-polar.
- ▶ When a triglyceride is saturated, it means that in its molecule the carbon chain is bound to hydrogen molecules in its maximum capacity, meaning that there are no double or triple bonds between carbon atoms.
- ▶ Saturated triglyceride molecules are generally solid fats at room temperature.



- of the carboxyl group and one hydrogen atom of the amine are lost resulting in the release of one water molecule.
- ▶ The chemical bond between two amino acids is called a peptide bond.
  - ▶ The peptide bond connects the nitrogen atom of the amine group of one amino acid to the carbon atom of the carboxyl group of another amino acid, releasing one molecule of water.
  - ▶ The central carbon atoms, the -R groups and the hydrogen atoms attached to the central carbon atoms do not participate in the peptide bond.
  - ▶ DNA and RNA, the nucleic acids, are the molecules responsible for the hereditary information that controls the protein synthesis in living organisms.
  - ▶ The name "nucleic" derives from the fact that they were discovered (by the Swiss biochemist Friedrich Miescher, in 1869) within the cell nucleus.
  - ▶ Nucleic acids are formed by sequences of nucleotides.
  - ▶ Nucleotides are composed of one molecule of sugar (deoxyribose in DNA and ribose in RNA) bound to one molecule of phosphate and to one nitrogenous base (adenine, uracil, cytosine or guanine, in RNA; and adenine, thymine, cytosine and guanine, in DNA).
  - ▶ Pentoses are carbohydrates made of five carbons. Deoxyribose is the pentose that composes DNA nucleotides and ribose is the pentose contained in RNA nucleotides.
  - ▶ The nitrogenous bases that form DNA and RNA are classified as pyrimidine and purine bases.
  - ▶ In DNA, nucleotides can be made up of adenine (A), thymine (T), cytosine (C) or guanine (G). In RNA, nucleotides can also contain adenine (A), cytosine (C) or guanine (G); however, instead of thymine (T), they contain uracil (U).
  - ▶ The phosphate group of one nucleotide binds to the pentose of the other nucleotide and so on to make the polynucleotide chain.
  - ▶ Each extremity of a DNA or RNA chain can be distinguished from the other extremity by its terminal chemical entity.
  - ▶ The phosphate-ended extremity is called a 5'-extremity and the pentose-ended extremity is called a 3'-extremity. Therefore, DNA or RNA chains can have a 5'-3' or 3'-5' direction.
  - ▶ These directions are important for several biological functions of DNA and RNA, since some reactions specifically occur in one direction or the other.
  - ▶ In eukaryotic cells, DNA is found within the cell nucleus. In prokaryotic cells, DNA is found dispersed in the cytosol, the fluid space inside the cell.
  - ▶ Watson (American), Crick (British) and Wilkins (New Zealander) were responsible for the discovery of the molecular structure of DNA, the double helix made of two polynucleotide chains paired by their nitrogenous bases. They won the Nobel Prize in medicine in 1962 for the discovery.
  - ▶ A DNA molecule is formed by two polynucleotide chains bound in antiparallel mode (5'-3' to 3'-5') and which form a helix structure.
  - ▶ The rule for the pairing of the nitrogenous bases of the polynucleotide chains that form DNA molecules is that pyrimidine base binds to purine base, under the condition that thymine (T) binds to adenine (A) and cytosine (C) binds to guanine (G).
  - ▶ In RNA, there is no binding between nitrogenous bases. That is because RNA is formed of only one polynucleotide chain, as opposed by DNA, which is formed of two chains. It is therefore not correct to ask



questions about base pairing in RNA.

- ▶ DNA molecules are made of two bound polynucleotide chains that form a helix structure (the double helix).
- ▶ In RNA there is only one nucleotide chain. RNA is a simple chain molecule and, as result, there is no need for the proportions of the nitrogenous bases that compose it.
- ▶ Which vitamin is essential for proper bones formation? Vitamin D
- ▶ To form the DNA molecule, purine bases bind to pyrimidine bases via intermolecular bonds called hydrogen bonds.
- ▶ DNA is not completely autonomous in its replication process because the replication does not occur without enzymatic activity. Therefore, it is not entirely correct to claim that DNA self-replicates.
- ▶ The fact that the DNA molecule is made of two polynucleotide chains whose nitrogenous bases form hydrogen bonds facilitates the replication of the molecule.
- ▶ During the DNA replication process, the hydrogen bonds between the nitrogenous bases of the polynucleotide chains are broken.
- ▶ As a result of DNA replication, two DNA molecules come into existence.
- ▶ During replication, each chain of the DNA molecule acts by pairing new nucleotides and, after the process, two newly formed chains made from the bond between these nucleotides appear.
- ▶ As a result, two DNA molecules are created, each with one chain from the original molecule and one new chain formed by new nucleotides.
- ▶ DNA replication occurs during mitosis as well during meiosis.
- ▶ A DNA molecule should replicate perfectly. However, sometimes failures in the replication occur, causing the alteration (deletion, addition or substitution) of one or more nucleotides in the molecule.
- ▶ Cells are equipped with an enzymatic system that tries to fix mistakes in the DNA replication process. However, this system is not completely efficient.
- ▶ DNA replication mistakes remain within the original individual in which the failure occurred when the phenomena affect somatic cells.
- ▶ In the nucleus of eukaryotic cells, RNA can be found in the nuclear fluid along with DNA, and is also the main component of the nucleolus.
- ▶ In the cytosol (in eukaryotes or in bacteria), RNA molecules can be found on their own, as a structural component of ribosomes (organelles specialized in protein synthesis) or even bound to them during the protein-making process.
- ▶ Mitochondria and chloroplasts also have their own DNA and RNA.
- ▶ Only DNA has two polynucleotide chains. RNA contains only one polynucleotide chain.
- ▶ The making of RNA from information contained in DNA is called transcription. The enzyme that catalyzes this process is RNA polymerase.
- ▶ A DNA polynucleotide chain serves as a template in replication (DNA duplication) as well as in transcription (RNA formation).
- ▶ In replication, the enzyme DNA polymerase catalyzes the formation of a new polynucleotide chain by using free nucleotides in the solution and inserting them into the new chain depending on the DNA template exposed and following the rule A-T, C-G.
- ▶ In transcription, the enzyme RNA polymerase makes a new polynucleotide chain depending on the DNA template exposed, and obeying



the rule A-U, C-G.

- ▶ In replication, the original template DNA chain is bound to the newly formed DNA chain via hydrogen bonds and a new DNA molecule is then created.
- ▶ In transcription, the bond between the template DNA chain and the newly formed RNA comes undone and RNA composed of only one polynucleotide chain is released.
- ▶ The three main types of RNA are: messenger RNA, or mRNA; transfer RNA, or tRNA; and ribosomal RNA, or rRNA.
- ▶ DNA is the source of information for RNA production (transcription) and therefore for protein synthesis. DNA is still the basis of heredity, due to its replication capability.
- ▶ The process in which DNA is synthesized by using an RNA chain as a template is called reverse transcription.
- ▶ In cells infected by retroviruses (RNA viruses, like the AIDS or SARS viruses), reverse transcription occurs and DNA is made from information contained in viral RNA.
- ▶ Viral RNA within the host cell produces DNA with the help of an enzyme called reverse transcriptase. Based on that DNA, the host cell then makes viral proteins, new viruses are assembled and viral replication occurs.
- ▶ The phosphate and pentose groups are the same in every nucleotide that composes a nucleic acid.
- ▶ Bacteria are prokaryotic and unicellular organisms.
- ▶ Bacteria have a simple organization; they contain an external cell wall, a plasma membrane, circular DNA within the cytoplasm and ribosomes for protein synthesis.
- ▶ Some bacteria are encapsulated, meaning that they have a polysaccharide capsule outside their

cell wall.

- ▶ Prokaryotic organisms are classified into two main groups: archaeobacteria and bacteria (the latter is also known as eubacteria).
- ▶ These are three types of archaeobacteria. Halophilic archaeobacteria only survive in salt-rich environments (even the salinity of the sea is not enough for them).
- ▶ Thermoacidophilic archaeobacteria are characterized by living in high temperatures and low pHs. Methanogen archaeobacteria are those that release methane gas ( $\text{CH}_4$ ). They are found in swamps.
- ▶ Bacteria are responsible for the decomposition process at the end of food chains and food webs. In this process, they also release useful gases and nutrients for other living organism.
- ▶ Bacteria that live within the digestive tracts of ruminants and some insects digest cellulose for these animals.
- ▶ Some bacteria also participate in the nitrogen cycle, carrying out the fixation of nitrogen, nitrification and denitrification, almost always in a mutualistic ecological interaction with plants.
- ▶ Bacteria present within living organisms, such as those that live inside the bowels, compete with other pathogenic bacteria, therefore helping to control the population of noxious agents.
- ▶ There are also bacteria that cause diseases and bacteria used in the production of medical drugs.
- ▶ When a river is polluted by organic material, the population of aerobic bacteria increases since the organic material is food for them.
- ▶ Some human diseases caused by bacteria are tuberculosis, pertussis, diphtheria, bacterial meningitis, gonorrhea, syphilis, the bubonic



plague, leptospirosis, cholera, typhoid fever, Hansen's disease, trachoma, tetanus and anthrax.

- ▶ Some vaccines are made of attenuated pathogenic bacteria or antigens present in bacteria.
- ▶ One of the most ancient uses of bacteria is the fermentation of milk to produce yogurt<sup>3</sup>, cheese and curds.
- ▶ Some methods of antibiotic production involve bacteria. Recombinant DNA technology (genetic engineering) allows the industrial production and commercialization of human proteins, such as insulin for diabetics, which is synthesized by mutant bacteria.
- ▶ Some bacteria can produce fuel, like methane gas.
- ▶ Pathogenic bacteria have characteristics known as virulence factors, which help them to parasite their hosts.
- ▶ Some bacteria have fimbriae, cilium-like structures that hook the bacterial cell onto the host tissue.
- ▶ Some bacteria are specialized in intracellular parasitism. Others secrete toxins, molecules that cause disease.
- ▶ In some cases, bacterial population growth causes food poisoning by toxins.
- ▶ Generally, bacterial disease is caused by bacterial population growth resulting in the invasion and destruction of tissues or by bacterial toxins that contaminate an organism.
- ▶ Most bacteria are heterotrophic, meaning that they do not produce their own food. There are also autotrophic bacteria, such as chemosynthetic bacteria or photosynthetic bacteria.
- ▶ Some photosynthetic bacteria, such as cyanobacteria, use photosynthesis like plants do, using water. Others, such as the sulfur photosynthetic bacteria, use hydrogen sulfide ( $H_2S$ ) instead of water.
- ▶ According to their need for oxygen, bacteria are classified into anaerobic (those that survive without oxygen) and aerobic (those that do not survive without oxygen).
- ▶ Obligate anaerobes are living organisms that do not survive in the presence of oxygen. For example, the bacteria *Clostridium tetani*, the agent of tetanus, is an obligate anaerobe.
- ▶ In superficial wounds, it is common to use hydrogen peroxide to expose anaerobic microorganisms to oxygen to kill them.
- ▶ Bacteria come in different shapes. A bacterium can be classified as coccus, bacillus, vibron or spirochete.
- ▶ The bacterial cell wall is made of peptidoglycans.
- ▶ Heterotrophic bacteria have ribosomes, essential for protein synthesis.
- ▶ Plasmids are circular fragments of DNA that are accessories to the main bacterial DNA.
- ▶ Plasmids are important for genetic engineering because genes from other organisms are inserted into them to produce recombinant organisms, such as mutant bacteria. These bacteria are made to produce useful proteins for humans on an industrial scale, for example.
- ▶ Bacteria reproduce through binary fission (scissiparity).
- ▶ Some bacteria use types of sexual reproduction (transformation, transduction or conjugation) with a combination of genetic material from different specimens.
- ▶ Sexual reproduction occurs when bacteria incorporate genetic material into other bacteria of the same species; the inserted genetic fragment then becomes a part of the genetic material of the second bacterium.
- ▶ The protist kingdom includes protozoa and algae. (Two groups of fungi with



similar characteristics to protozoa, myxomycetes and oomycetes, have been classified as protists.)

- ▶ Unicellular protozoa and algae are unicellular eukaryotes.
- ▶ Pluricellular algae are also eukaryotes of simple structure. Protists are believed to be the phylogenetic ancestors of the living organisms of the other eukaryotic kingdoms (fungi, animals and plants).
- ▶ The basic difference between protozoa and algae is the fact that protozoa are heterotrophs whereas algae are photosynthetic autotrophs.
- ▶ Protozoa are unicellular organisms that present some characteristics in common with animal cells.
- ▶ There is strong support for the hypothesis that animal cells evolved from protozoa.
- ▶ Protozoa are eukaryotic cells and, as a result, have organelles and structures common to this kind of cell: endoplasmic reticula, a Golgi apparatus, digestive vesicles, ribosomes, mitochondria, a nucleus with genetic material, karyotheca, etc.
- ▶ Protozoa from the mastigophora group (such as trichomonas) have flagella and others from the ciliated group (like paramecium) have cilia.
- ▶ All protozoa, because they are eukaryotes, have a nucleus. Some species, such as paramecium, have two nuclei: the macronucleus and micronucleus.
- ▶ The macronucleus is the cell nucleus in the normal sense, it contains DNA and RNA and acts as the center of cellular control and regulation.
- ▶ The micronucleus has reproductive functions and is related to the conjugation process (sexual reproduction).
- ▶ Protozoa are heterotrophic organisms, meaning that they do not make their own food and therefore they need to

- search for it in the environment.
- ▶ Protozoa have developed several locomotion mechanisms and actively move towards food.
  - ▶ Amoebae, move through amoeboid movements, which are small projections and invaginations of their plasma membrane (pseudopods) that alter the external shape of the cell, making it move along surfaces.
  - ▶ The outer face of the plasma membrane of paramecia is covered by cilia that flap around, helping the cell to move.
  - ▶ Trichomonas are flagellated protozoa, meaning that they have relatively long filaments outside the cell that vibrate and make it possible for them to swim in fluid environments.
  - ▶ Digestion in protozoa is intracellular digestion: organic material is internalized and broken down inside the cell.
  - ▶ Protozoa obtain food via phagocytosis. This food is digested when phagosomes fuse with lysosomes within the cell, forming digestive vacuoles.
  - ▶ The digestive vacuoles produce residual bodies that are eliminated from the cell by exocytosis.
  - ▶ In paramecium, the entrance of food into the cell and the excretion of digestive waste products occur in specialized regions of the plasma membrane, called the cytostome and the cytoppyge.
  - ▶ Fresh water has a lower concentration of solutes than sea water and it (fresh water) tends to be less concentrated than the intracellular environment, causing cells to swell.
  - ▶ The vacuoles of protozoans are internal structures specialized in water storage that release water into the cytoplasm when necessary.
  - ▶ Vacuoles can dilute the cytoplasm to put it into osmotic equilibrium with the



- ▶ Some plants use toxins to prevent self pollination.
- ▶ Pollen refers to powdery spores.
- ▶ Pollen is a botanical term used as long ago as 1760 by Carolus Linnaeus, the inventor of the binomial nomenclature system of classification.
- ▶ The term pollen referred to "the fertilizing element of flowers." Pollen has come to be known as "fine, powdery, yellowish grains or spores."
- ▶ Photosynthesis occurs in eukaryotic cell structures called chloroplasts.
- ▶ A chloroplast is a type of plant cell organelle known as a plastid. Plastids assist in storing and harvesting needed substances for energy production.
- ▶ A chloroplast contains a green pigment called chlorophyll, which absorbs light energy for photosynthesis.
- ▶ The name chloroplast indicates that these structures are chlorophyll containing plastids.
- ▶ Like mitochondria, chloroplasts have their own DNA, are responsible for energy production, and reproduce independently from the rest of the cell through a division process similar to bacterial binary fission.
- ▶ Chloroplasts are also responsible for producing amino acids and lipid components needed for chloroplast membrane production.
- ▶ Chloroplasts can also be found in other photosynthetic organisms such as algae.
- ▶ Plant chloroplasts develop mainly in cells located in plant leaves.
- ▶ Chloroplasts and other plastids develop from cells called proplastids.
- ▶ Proplastids are immature, undifferentiated cells that develop into different types of plastids.
- ▶ A proplastid that develops into a chloroplast, only does so in the presence of light.
- ▶ Chloroplasts contain several different structures, each having specialized functions.
- ▶ Thylakoid Membrane is internal membrane system consisting of flattened sac-like membrane structures called thylakoids that serve as the sites of conversion of light energy to chemical energy.
- ▶ Grana (singular granum) is a dense layered stacks of thylakoid sacs that serve as the sites of conversion of light energy to chemical energy.
- ▶ Stroma is a dense fluid within the chloroplast that lies inside the envelope but outside the thylakoid membrane. This is the site of conversion of carbon dioxide to carbohydrates (sugar).
- ▶ Chlorophyll is a green photosynthetic pigment within the chloroplast grana that absorbs light energy.
- ▶ In photosynthesis, the sun's solar energy is converted to chemical energy.
- ▶ The chemical energy is stored in the form of glucose (sugar). Carbon dioxide, water, and sunlight are used to produce glucose, oxygen, and water. Photosynthesis occurs in two stages.
- ▶ The cell wall is the rigid, semi-permeable protective layer in some cell types.
- ▶ In plants, the cell wall is composed mainly of strong fibers of the carbohydrate polymer cellulose.
- ▶ Cellulose is the major component of cotton fiber and wood and is used in paper production.
- ▶ The plant cell wall is multi-layered and consists of up to three sections. From the outermost layer of the cell wall, these layers are identified as the middle lamella, primary cell wall, and secondary cell wall.



carrying cellular components along the way. They are typically used to pull organelles toward the cell membrane.

- ▶ Dyneins are similar to kinesins and are used to pull cellular components inward toward the nucleus. Dyneins also work to slide microtubules relative to one another as observed in the movement of cilia and flagella.
- ▶ Myosins interact with actin in order to perform muscle contractions. They are also involved in cytokinesis, endocytosis (endo-cyt-osis), and exocytosis (exo-cyt-osis).
- ▶ Centrioles help to organize the assembly of microtubules.
- ▶ Cell Membrane protects the integrity of the interior of the cell.
- ▶ Golgi Complex manufactures, stores and ships certain cellular products.
- ▶ Lysosomes digest cellular macromolecules.
- ▶ Mitochondria provide energy for the cell.
- ▶ Nucleus controls cell growth and reproduction.
- ▶ Peroxisomes detoxify alcohol, form bile acid, and use oxygen to break down fats.
- ▶ Ribosomes responsible for protein production via translation
- ▶ There are two primary types of cells: prokaryotic and eukaryotic cells.
- ▶ Lysosomes are organelles that are found in most animal cells and act as the digesters of a eukaryotic cell.
- ▶ Lysosomes are spherical membranous sacs of enzymes. These enzymes are acidic hydrolase enzymes that can digest cellular macromolecules.
- ▶ The lysosome membrane helps to keep its internal compartment acidic and separates the digestive enzymes from the rest of the cell.
- ▶ Lysosome enzymes are made by the endoplasmic reticulum and enclosed within vesicles by the Golgi apparatus. Lysosomes are formed by budding from the Golgi complex.
- ▶ Lysosomes contain various hydrolytic enzymes (around 50 different enzymes) that are capable of digesting nucleic acids, polysaccharides, lipids, and proteins.
- ▶ Lysosomes act as the "garbage disposal" of a cell. They are active in recycling the cell's organic material and in the intracellular digestion of macromolecules.
- ▶ In humans, a variety of inherited conditions can affect lysosomes. These gene mutation defects are called storage diseases and include Pompe's disease, Hurler Syndrome and Tay-Sachs disease.
- ▶ Peroxisomes are small organelles found in eukaryotic plant and animal cells. Hundreds of these round organelles can be found within a cell.
- ▶ In animal cells, peroxisomes synthesize cholesterol and bile acids (produced in the liver).
- ▶ In plant cells, peroxisomes convert fatty acids to carbohydrates for metabolism in germinating seeds.
- ▶ Peroxisomes reproduce similarly to mitochondria and chloroplasts in that they have the ability to assemble themselves and reproduce by dividing.
- ▶ Both prokaryotic and eukaryotic cells contain structures known as cilia and flagella. These extensions from the cell surface aid in cell movement.
- ▶ Cilia and flagella are protrusions from some cells that aid in cellular locomotion. They also help to move substances around cells and direct the flow of substances along tracts.
- ▶ Cilia and flagella are formed from specialized groupings of microtubules called basal bodies.
- ▶ If the protrusions are short and numerous they are termed cilia. If they



respectively. In both cases, the ribosomes usually form aggregates called polysomes or polyribosomes during protein synthesis.

- ▶ Polyribosomes are clusters of ribosomes that attach to a mRNA molecule during protein synthesis.
- ▶ Free ribosomes usually make proteins that will function in the cytosol (fluid component of the cytoplasm), while bound ribosomes usually make proteins that are exported from the cell or included in the cell's membranes.
- ▶ Organelles such as mitochondria and chloroplasts in eukaryotic organisms have their own ribosomes.
- ▶ Ribosomes in these organelles are more like ribosomes found in bacteria with regard to size.
- ▶ The subunits comprising ribosomes in mitochondria and chloroplasts are smaller (30S to 50S) than the subunits of ribosomes found throughout the rest of the cell (40S to 60S).
- ▶ Protein synthesis occurs by the processes of transcription and translation. In transcription, the genetic code contained within DNA is transcribed into an RNA version of the code known as messenger RNA (mRNA).
- ▶ In translation, a growing amino acid chain, also called a polypeptide chain, is produced.
- ▶ Ribosomes help to translate mRNA and link amino acids together to produce a polypeptide chain.
- ▶ The polypeptide chain eventually becomes a fully functioning protein. Proteins are very important biological polymers in our cells as they are involved in virtually all cell functions.
- ▶ Ribosomes are only one type of cell organelle. The following cell structures can also be found in a typical animal eukaryotic cell:
- ▶ Centrioles helps to organize the assembly of microtubules.

- ▶ Lysosomes digest macromolecules.
- ▶ Mitochondria provide energy for the cell.
- ▶ Nucleus controls cell growth and reproduction.
- ▶ Peroxisomes detoxify alcohol, form bile acid, and use oxygen to break down fats.
- ▶ The cytoskeleton is a network of fibers that forms the "infrastructure" of eukaryotic cells, prokaryotic cells, and archaeans. In eukaryotic cells, these fibers consist of a complex mesh of protein filaments and motor proteins that aid in cell movement and stabilize the cell.
- ▶ The cytoskeleton extends throughout the cell's cytoplasm and provides a number of important functions.
- ▶ Cytoskeleton helps the cell maintain its shape and gives support to the cell.
- ▶ A variety of cellular organelles are held in place by the cytoskeleton.
- ▶ Cytoskeleton assists in the formation of vacuoles.
- ▶ The cytoskeleton assists in the transportation of communication signals between cells.
- ▶ The cytoskeleton is composed of at least three different types of fibers: microtubules, microfilaments, and intermediate filaments.
- ▶ Microtubules are hollow rods functioning primarily to help support and shape the cell and as "routes" along which organelles can move.
- ▶ Microtubules are typically found in all eukaryotic cells. They vary in length and measure about 25 nm (nanometers) in diameter.
- ▶ A number of motor proteins are found in the cytoskeleton. As their name suggests, these proteins actively move cytoskeleton fibers.
- ▶ Kinesins move along microtubules



environment.

- ▶ As a result, fresh water protozoa need vacuoles more, since their intracellular environment is hypertonic in relation to the exterior.
- ▶ Without the dilution mechanism provided by the vacuoles, fresh water protozoa would absorb too much water and would die.
- ▶ In protozoa, reproduction can be either sexual or asexual. The most frequent form of sexual reproduction is binary division, or scissiparity, in which the cell divides via mitosis, producing two daughter cells.
- ▶ Some species, such as plasmodium, the agent of malaria, reproduce asexually via schizogony (multiple fission); in this form of reproduction, the cell becomes multinucleate, generally inside a host cell, and each nucleus is expelled together with a portion of the cytoplasm, producing new protozoans.
- ▶ Sexual reproduction in protozoa can happen via conjugation, with the incorporation of genetic material from one cell into another, or through gametes that fertilize others and form zygotes.
- ▶ In plasmodium, sexual reproduction happens in the mosquito, the definitive host, where the zygote undergoes mitosis (sporogony), creating many sporozoites.
- ▶ Sexual reproduction always generates more genetic variation than asexual reproduction.
- ▶ The hypothesis that protozoa are the origin of multicellular animals is further strengthened by the fact that these protozoa were able to reproduce sexually, since only genetic variation can produce biological differentiation to the point of creating new types of living organisms.
- ▶ The four main groups of protozoa are sarcodines (those that form pseudopods, such as amoebae),

mastigophores (flagellated, like trypanosome 'which causes Chagas' disease), ciliated (like paramecia) and sporozoans (spore-forming, like plasmodia).

- ▶ There is a controversy surrounding euglena because they tend to be classified sometimes as protozoa and sometimes as algae.
- ▶ Although algae have chloroplasts and are photosynthetic autotrophic organisms, euglena do not have a cell wall and can survive by "eating" substances from the environment when light is not available for photosynthesis.
- ▶ Euglena also have a photosensitive structure called the stigma, which orients the movement of the cell towards light.
- ▶ Nowadays, euglena are classified as algae, but it is suspected that they are a common ancestor of algae and protozoans.
- ▶ Some algae reproduce sexually and others reproduce asexually.
- ▶ In unicellular algae, reproduction is generally asexual and is carried out via binary division.
- ▶ In pluricellular algae, asexual reproduction can occur via fragmentation or sporulation.
- ▶ In the sexual reproduction of algae, uni or pluricellular, the fusion of gametes (syngamy) occurs.
- ▶ In some algae, all cells can become gametes and in others only some cells can be used in that way.
- ▶ Some species may present the alternation of generations, forming gametophytes and sporophytes with different ploidies.
- ▶ Many types of algae have high nutritional values and are commercialized and consumed as human food.
- ▶ Jelly compounds are extracted from



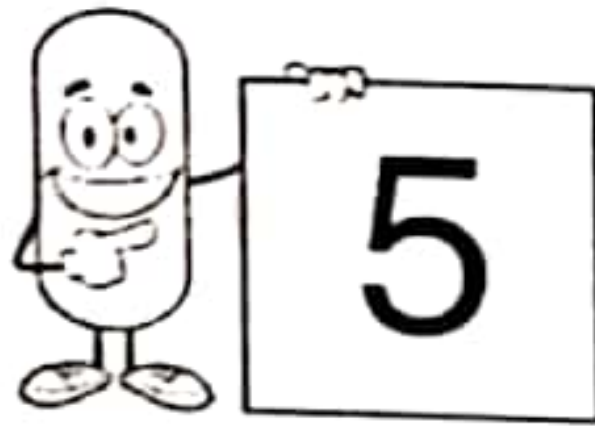
some algae, such as glues and pastes for industrial and commercial use.

- ▶ Agar-agar, used as a medium for biological culture in laboratories, and the substance carrageenin, an ingredient in tooth paste, cosmetics, paint and hygiene products, are extracted from rhodophyte algae.
- ▶ Diatom algae on the bottom of the ocean form diatomites, used in the production of filters, refractories, thermal insulation and cement. Some algae are used as agricultural fertilizers.
- ▶ The red tide is a phenomenon that occurs when dinoflagellates (algae from the pyrrophyte group) reproduce excessively in the ocean.
- ▶ These algae release toxins that affect the nervous system and can cause death in the marine animals that ingest them and in humans that eat contaminated animals.
- ▶ There are unicellular and pluricellular fungi. All fungi are eukaryotes and heterotrophs.
- ▶ Fungi have cells whose cell walls are made of chitin, the same substance that composes the exoskeleton of arthropods.
- ▶ Fungi, like animals, are characterized for their storage of glucose in the form of its polymer glycogen.
- ▶ Viruses are considered living organisms but they do not have a cellular structure.
- ▶ There is some controversy regarding their classification as living organisms. However, the fact that they self-replicate and have genetic material reinforces that classification.
- ▶ Viruses are made up of genetic material (DNA or RNA) covered by a protein capsule also known as a capsid.
- ▶ Some viruses, like HIV, also have an external envelope produced from the

plasma membrane of the host cell from which it came.

- ▶ What now-extinct bird's gizzard, when stewed in milk, was once thought to cure gallstones? The passenger pigeon's
- ▶ What comes in Bibb, oak leaf and escarole varieties? Lettuce
- ▶ What treatment for cavities was first recommended by a 10th-century physician name Rhazes? Fillings
- ▶ What car parts require alignment in toe, camber and caster? Wheels
- ▶ What oil was first used as a laxative by Egyptians in 1600 B.C.? Castor oil
- ▶ What continent has yielded the largest trove of meteorites? Antarctica
- ▶ What branch of biology deals with the nature of aging? Gerontology
- ▶ What tropical disease were mental patients intentionally infected with in the early 1900s as a treatment for insanity? Malaria
- ▶ What's a detective studying if he's staring at arches loops, whorls, islands and dots? Fingerprints
- ▶ What chemical compound comes from the Greek word for "primary"? Protein
- ▶ What's the most common cause of cirrhosis? Alcohol abuse
- ▶ A supernova is a stellar explosion which produces an extremely bright object made of plasma that declines to invisibility over weeks or months.
- ▶ Oxidation is the combination of oxygen or removal of hydrogen
- ▶ Horticulture is the cultivation of flowers, fruits and vegetable
- ▶ Pasteurization is the protection of food by heating
- ▶ Method of preparation of wamish was discovered by Jabir bin Hayaan





- ▶ The troposphere is the layer nearest to the earth's surface and extends from sea-level to a height of about 15 km.
- ▶ Region of troposphere is the densest of all the atmospheric layers and contains water vapour, moisture and dust.
- ▶ Region of troposphere the temperature decreases as the height increases from the earth.
- ▶ Tropopause is the layer which separates the troposphere (lowest layer) from the stratosphere (upper layer).
- ▶ Stratosphere is the region of uniform temperature extending from an altitude of about 15km above the earth to a height of about 50 km. It is free from water vapour, clouds and dust.
- ▶ Mesosphere is a very cold region and lies above the ozone-rich layer of the stratosphere.
- ▶ Mesosphere extends from 50 or 80 km above the earth's surface.
- ▶ The Menopause separates the mesosphere from the next layer called the ionosphere.
- ▶ The ionosphere lies immediately above the mesosphere and extends from 60 to 400 km above the earth's surface.
- ▶ Ionosphere layer contains ionised (or electrically charged) air which protects the earth from the falling meteorites (shooting stars) as most of them burn out in this region.
- ▶ Ionosphere also protects the earth from the harmful radiations of the sun.
- ▶ The ionosphere consists of 'D', 'E' and 'F' layers and includes the thermosphere and exosphere.
- ▶ Thermosphere is the middle layer of the ionosphere. It is the region of the atmosphere where the temperature is above 100°C.
- ▶ The exosphere is the uppermost region of the ionosphere and makes up the outer limits of the atmosphere.
- ▶ The gravity of the earth is exceedingly weak in exosphere.
- ▶ The magnetic belt of the earth which is known as magnetosphere, extends to about 64,000 km above the earth's surface.
- ▶ The exosphere is now considered as part of the magnetosphere.
- ▶ The outer boundary of the magnetosphere or the final boundary between the earth and outer space is known its magnetopause.
- ▶ The land surface of the earth is made up of immense land masses divided into seven continents and a great number of islands.
- ▶ It is believed that originally there was only one land mass called Pangaea before seven continents.
- ▶ Pangaea, large land mass split into a northern mass Laurasia and a southern one called Gondwana Land.
- ▶ From these two land masses (Laurasia and Gondwana), the continents gradually drifted to where they are now located and the process is still continuing.
- ▶ Every square inch of the human body has about 19,000,000 skin cells.
- ▶ The small intestine in the human body is about 2 inches around, and 22 feet long.
- ▶ The human body has approximately 37,000 miles of capillaries.



- ▶ The adult human body requires about 88 pounds of oxygen daily.
- ▶ Dead cells in the body ultimately go to the kidneys for excretion.
- ▶ The human body is 70% water.
- ▶ Women hearts beat faster than men.
- ▶ If temperature rises gradually up to 40 deg: C, the rate of photosynthesis may stop altogether
- ▶ Collagen is the substance that gives elasticity to skin
- ▶ Carbon dioxide we release comes from food we eat
- ▶ Fats are made of carbon, hydrogen and oxygen
- ▶ Protein found in milk is Casein, in beans is Legumes, in meat is myosin and in eggs is albumin
- ▶ Alfred Nobel was born in Stockholm, Sweden, more than 150 years ago. In what year was he born? Alfred Nobel was born in 1833
- ▶ What is a constellation? A constellation is a group of stars that, when seen from Earth, form a pattern.
- ▶ How many named constellations are there? There are 88 constellations.
- ▶ The Great Red Spot on Jupiter is a hurricane-like storm system. It is large enough that two Earths could fit across it.
- ▶ Where is the element gold come from? Gold only comes from Super Novae
- ▶ Retina is the light-receptive layer in the eye. It is composed of rods and cones. Rods are concerned with vision in dim light whereas cones are sensitive to colours and bright light.
- ▶ Spleen is the largest lymphatic organ of the body located immediately below the diaphragm on the left side. Formation of red blood cells, storage of blood and destruction of corpuscles are some of its main functions.
- ▶ Thyroid glands are small ductless glands on either side of the windpipe in the neck.
- ▶ The hormones secreted by Thyroid gland contain 65 per cent of iodine. Its deficiency causes dwarfness in children and goitre in adults.
- ▶ Veins are the blood vessels which carry blood back to heart from different parts of the body.
- ▶ Ventricles are the two lower chambers of the heart from which purified blood flows out through of the arteries.
- ▶ Vitreous humor is the transparent fluid in the posterior chamber of the eye.
- ▶ Stomach secreting the gastric juice
- ▶ Pancreas secreting the pancreatic juice
- ▶ Liver secreting the bile
- ▶ Alimentary canal is a long coiled tube starting from mouth and ending at anus and consisting of gullet, esophagus, stomach, small intestine, large intestine, rectum and anus.
- ▶ Small Intestine: Food from the stomach passes into the small intestine and is mixed with bile and pancreatic juice coming from liver and pancreas.
- ▶ Bile has no digestive enzyme, so it does not take part directly in digestion.
- ▶ Pancreatic juice has three enzymes trypsin, amylase and lipase.
- ▶ Trypsin acts upon peptones and proteoses changing them into polypeptides and amino-Acids.
- ▶ Amylase changes starch and glycogen into maltose
- ▶ The products of digestion are finally absorbed in the wall of small intestine and taken into blood.
- ▶ The large intestine receives undigested materials of the food from the small intestine. It absorbs water and then passes the material into the rectum.



- ▶ Liver produces bile which is stored in the gall bladder. Bile contains water, bile salts and bile pigments and has no digestive enzymes.
- ▶ Bile contains salts like bicarbonate glycocholate and taurocholate of sodium. Sodium bicarbonate neutralizes the acid and makes the churned food called chyme, alkaline, glyconate and taurocholate of sodium break down the fats of tissues into small globules which can mix with water to form an emulsion.
- ▶ Organic substances such as glucose, amino-acids, fats, urea, hormones and enzymes occur in plasma.
- ▶ Corpuscles are of two kinds, red and white.
- ▶ Red corpuscles are produced in the spleen. They form the majority of blood corpuscles. They contain the protein pigment haemoglobin which gives the red colour. It also has iron.
- ▶ Haemoglobin is a protein pigment in red blood cells.
- ▶ Haemoglobin combines readily with oxygen in lungs to form a loose compound called oxyhaemoglobin which is transported to tissues where it breaks up into haemoglobin and oxygen.
- ▶ The oxygen is used up by tissues for oxidation and the resultant carbon dioxide is carried away by the blood.
- ▶ A, B, AB and O are the four main blood groups.
- ▶ When blood of any two groups is mixed agglutination or clotting of blood corpuscles occurs and so only blood of the same group is used in blood transfusion.
- ▶ Blood bank is a reservoir of blood maintained in hospitals for emergency, transfusion.
- ▶ Heart is a strong muscular organ situated in the chest between the right and left lungs and enclosed in a bag called the pericardium.
- ▶ Heart Heart lies behind the breast and the ribs slightly to the left. It has two auricles on the upper half and two ventricles on the lower half, separated from each other by partitions. These parts have valves between them.
- ▶ Auricles of the heart contract and expand alternately.
- ▶ Heart The right auricle receives impure blood from a large vein and the left auricle receives pure blood from the lungs.
- ▶ The pure blood from the left ventricle goes into a large aorta and the impure blood from the right ventricle goes into the pulmonary artery.
- ▶ The aorta takes blood to various parts of the body.
- ▶ The pulmonary artery takes impure blood to the lungs.
- ▶ When ventricles relax (diastole) the auricles are again filled with blood and the same process is repeated.
- ▶ The contractions of ventricles are called heart beats.
- ▶ Veins have valves and contain blood flowing to the heart. The backward flow of blood (away from the heart), the pulsation of heart is checked by these valves.
- ▶ Breathing involves intake of oxygen (inspiration) from atmospheric air and expulsion of carbon dioxide (expiration).
- ▶ The respiratory system is composed of nostrils, wind pipe or trachea, bronchi and bronchioles, lungs.
- ▶ The lungs are enclosed in a compartment formed by the ribs, the breast bone and backbone and perform the function of respiration.
- ▶ Endocrine is the system of ductless glands linked by nervous and circulatory system. They secrete hormones. The hormones control growth and other essential activities in the life process of the body.



- ▶ Pituitary is a small gland situated beneath the brain. It secretes the important pituitrin hormone.
- ▶ Hormones are chemical substances produced by endocrine glands which pass into blood to be carried to different parts of the body.
- ▶ Hormones are produced in extremely minute quantities but their action is very rapid and they cause a definite physiological reaction.
- ▶ Excretory system eliminates harmful waste products formed in the body. The main excretory organs are lungs, kidneys, skin and large intestine.
- ▶ Lungs throw out carbon dioxide and water vapour.
- ▶ Large intestine excretes waste matter of digestion and kidneys excrete urine.
- ▶ Skin excretes sweat.
- ▶ Kidneys take away the nitrogenous end products of metabolism, chiefly urea.
- ▶ Nervous system controls and regulates the activities of all the other systems of body. It coordinates the reception of external stimuli and responds to them by sensory nerves and motor nerves.
- ▶ The whole Nervous system is divided into three parts: (1) the central nervous system, (2) the peripheral nervous system, and (3) the autonomic nervous system.
- ▶ Allergy is a condition in which a person is sensitive or susceptible to the effects of any drug or an article by which normal persons are not affected.
- ▶ Hayfever, asthma, eczema are allergic diseases.
- ▶ Anaesthetics are drugs used by surgeons to remove pain during an operation.
- ▶ Chloroform is a prominent anaesthetic.
- ▶ Deliquescence are substances which have the property of absorbing moisture on exposure to air and finally transform into a liquid state. Calcium chloride is one such substance.
- ▶ The main functions of lungs are to purify the blood, i.e., to separate carbon dioxide and water vapour; and to supply oxygen to the blood.
- ▶ Hibernation: the animals which live under-ground for certain periods of a year are called hibernating, e.g., frog.
- ▶ The clouds of rarefied gas which exist between stars glow due to the radiation of the light of the stars. The radiated clouds of rarefied gas are called Nebulae. Their visibility is hazy and faint.
- ▶ The moon rotates on its axis once in  $27\frac{1}{2}$  days and it also takes the same time e.g.,  $27\frac{1}{2}$  days, to revolve around the earth. Hence only one side of the moon remains visible to the earth throughout.
- ▶ The moon takes  $27\frac{1}{2}$  days to rotate on its axis. Therefore its days and night each extends to about two weeks.
- ▶ The astronauts of Apollo-11 landed on moon in July 1969 and those of Apollo-12 in November 1969.
- ▶ Name the place from which Apollo-11 and 12 were fired into space? Cape Kennedy
- ▶ Days and nights are equal throughout the year at the equator.
- ▶ The equator runs through the centre of the earth and the centre of the earth remains exactly in the same position in relation to the sun throughout the year.
- ▶ Day is longest on 21st June and night is longest on 22nd December in the northern hemisphere.
- ▶ A thermonuclear reaction in which nuclei of lighter atoms combine to form nuclei of heavier atoms and a large amount of energy is released.
- ▶ Fusion reactions are considered to be the endless source of energy given out by sun.



- ▶ Global telecast is a communication satellite for receiving, amplifying and retransmitting television broadcasts more distinctly.
- ▶ What is Mach 1 speed of an aeroplane? 760 miles per hour
- ▶ The ecliptic is the apparent annual path of the sun's centre on the celestial sphere. It is a great circle inclined  $23\frac{1}{2}$  to the celestial equator
- ▶ A body weighs slightly more at the poles than at the equator because of the greater gravitational pull of the earth at the poles.
- ▶ Ice is lighter than water and floats. It is heavier than alcohol and so sinks in alcohol.
- ▶ Ballistics is the science of the motion of the projectiles.
- ▶ Clotting of blood in the blood vessels is called thrombosis.
- ▶ Pyorrhoea is disease of the Teeth
- ▶ Fermentation is caused by enzymes.
- ▶ Burning of sulphur is a Chemical change.
- ▶ A Catalyst alters the speed of chemical reaction.
- ▶ The planet Jupiter lies at the outermost orbit of the solar system.
- ▶ The reading glass is a convex lens
- ▶ A Fuse is used to protect electrical circuits.
- ▶ Atoms having the same atomic number but differing in mass are called Isotopes
- ▶ Solar eclipses could occur on a new moon day.
- ▶ Gene is the unit of the material of inheritance, present in the chromosomes, which is passed on to the next generation.
- ▶ Chemically, Gene is made up of nucleic acid.
- ▶ Bile is a brownish green digestive fluid secreted by liver of vertebrates and is passed through bile-duct to duodenum. It is important in the digestion of fats.
- ▶ Virus is a member of a group of sub-microscopic agents that live, grow and reproduce its kind inside the host cell
- ▶ Our brain is more complex than the most powerful computer and has over 100 billion nerve cells.
- ▶ We give birth to 100 billion red cells every day.
- ▶ When we touch something, we send a message to our brain at 124 mph.
- ▶ We are about 70 percent water.
- ▶ Our nose is our personal air-conditioning system: it warms cold air, cools hot air and filters impurities.
- ▶ In one square inch of our hand we have nine feet of blood vessels, 600 pain sensors, 9000 nerve endings, 36 heat sensors and 75 pressure sensors.
- ▶ An eternal flame lamp at the tomb of a Buddhist priest in Nara, Japan has kept burning for 1,130 years.
- ▶ A sea is defined as a division of the ocean which is enclosed or partially enclosed by land.
- ▶ The Caspian Sea, Dead Sea, and Aral Sea are actually saltwater lakes, because they lack an outlet to the ocean.
- ▶ The saltiest sea in the world is the Red Sea
- ▶ The maximum amount of water vapor, which could be present in  $1\text{ m}^3$  of the air at any given temperature, is called absolute humidity.
- ▶ Penicillin is widely used as an antibiotic
- ▶ The air we inhale is mixture of gases. Nitrogen in the mixture is highest in percentage
- ▶ The chief constituent of gobar gas is methane



- ▶ The latitudinal differences in pressure delineate a number of major pressure zones, which correspond with zones of climate
- ▶ Atmosphere of sun has 3 layers
- ▶ In 28 days moon returns to the same position in its orbit
- ▶ Earth's surface temperature has increase mainly because of Higher level of CO<sub>2</sub> concentration
- ▶ Circulation of blood was described by a Muslim scientist name Abn e Nafis
- ▶ Al-Khwarizimi was first person who used zero.
- ▶ 1480, 00,000 km is the distance from sun to earth.
- ▶ Temperature of Sun is 6000 degree C.
- ▶ Planet with ring is Saturn
- ▶ Norman Borlaug was Agricultural Scientist who developed high yielding varieties of wheat and got Peace Nobel Prize
- ▶ First fully sequenced human genome was completed in April 2003
- ▶ Solar system was discovered by Nicolaus Copernicus.
- ▶ RAM stands for Random Access Memory.
- ▶ Borlaug, Norman Ernest was American agricultural scientist t and winner of the Nobel Prize for Peace in 1970. He was one of those who laid the groundwork of the Green Revolution.
- ▶ The readings of a Fahrenheit and a Centigrade temperature is the same at -40°.
- ▶ Gregory Mendel is called the Father of Genetics.
- ▶ Fenugreek seeds can benefit a patient of diabetes mellitus by normalizing his blood sugar level.
- ▶ Powder-type fire extinguisher is used for petroleum fire.
- ▶ G.J. Mendel is known as founder of genetics.
- ▶ Photolysis is dissociation of water molecule in the chemical reaction of photosynthesis.
- ▶ Lachrymal glands secrete tears
- ▶ Sweat glands secrete sweat
- ▶ Pancreas secrete pancreatic juice
- ▶ Salivary glands secrete saliva
- ▶ Sebaceous glands secrete sebum
- ▶ Mammary glands secrete milk
- ▶ Liver secretes bile
- ▶ Thyroid secrete thryoxine
- ▶ Pituitary secretes pituitrin
- ▶ Adrenal glands secrete cortin and adrenalin
- ▶ Ovary secretes estrogen
- ▶ Testes secrete testosterone
- ▶ Parathyroid secretes parathormone
- ▶ Which planet looks reddish in the night sky? Mars
- ▶ The study of heavenly bodies is known as Astronomy
- ▶ A seed is a ripened ovule.
- ▶ Pea can fix nitrogen from air.
- ▶ Exbiology is the study of life or its possibility on other planets.
- ▶ Sandy soil is dry in comparison to clay due to Capillary action.
- ▶ When two organisms exit in such a way that only one is benefited by the other, the relationship is called Parasitism.
- ▶ Silicon valley in California is famous because of Software Industry
- ▶ The cornea is the only living tissue in the human body that does not contain any blood vessels.
- ▶ What is the freezing point of heavy water? Freezing point (°C) 3.82, Boiling point (°C) 101.4
- ▶ Which of the following planets takes



- ▶ nearly the same time for a rotation on its own axis as does the Earth? Mars
- ▶ How many feet in a fathom Six
- ▶ Clocks, which moves with the velocities comparable with the velocity of light, run: with zero velocity
- ▶ The major natural regions of the world are delineated primarily on the basis of temperature, rainfall and cultivated vegetation
- ▶ the plane of the earth's equator were not inclined to the plane of
- ▶ If you had rubella what would you have caught: German Measles
- ▶ Which two metals are alloyed to make pewter: Tin and Lead
- ▶ Oil seed rape belongs to which plant family: Mustard
- ▶ Hippocratic is regarded as the father of medicines
- ▶ Pepsin produced in stomach which digests the Proteins
- ▶ Tears are produced by lachrymal glands
- ▶ Electromagnetic wave theory of light was proposed by Maxwell
- ▶ Natural radioactivity was discovered by Becquerel in 1896
- ▶ The ability or capacity to do work is called Energy
- ▶ Energy possessed by a body due to its motion is called Kinetic Energy
- ▶ Lens which is thinner at the centre and thicker at the edge is called Concave Lens
- ▶ A lens which is thicker at the centre and thinner at the edges is called Convex Lens
- ▶ A universal donor has blood group is O
- ▶ Helium and neon called Noble Gases
- ▶ The charge on an electron is Negative and charge on a proton is Positive
- ▶ Fluorine is used to prevent tooth decay.
- ▶ Diameter of a lens is called Aperture
- ▶ Most abundant element in human body is Oxygen
- ▶ The rate of change of displacement is called Velocity
- ▶ The diffraction of light was discovered by Maxwell
- ▶ The ability or capacity to do work is called Energy
- ▶ Energy possessed by a body due to its motion is called Kinetic Energy
- ▶ Energy in sun produced by hydrogen nuclei is the result of Fusion
- ▶ Main constituent of sun is  $H_2$
- ▶ The distance travelled by light in one year is defined as Light year
- ▶ The Sun is made of gases mainly Hydrogen and Helium
- ▶ Red Color has shortest wavelength
- ▶ Our eyes are sensitive to blue light.
- ▶ Aorta is an organ of circulatory system.
- ▶ This increase of white blood corpuscles causes leukemia.
- ▶ Slavery in America was abolished by Abraham Lincoln.
- ▶ Most abundant element in human body is Oxygen
- ▶ Energy in sun produced by hydrogen nuclei is the result of Fusion
- ▶ Mercury is also known as Quick Silver.
- ▶ Female mosquito Aedes Aegypties is the cause of Dengue fever
- ▶ Blood Sugar is measured in mg/deciliter
- ▶ Blood pressure is measured in mmHg
- ▶ Vaccination for smallpox' was discovered by Jenner
- ▶ Who is regarded as the father of medicines? Hippocratic
- ▶ Atmospheric pressure at sea level is 760 mm



- ▶ Radio carbon dating process is used to find the age of Fossils.
  - ▶ Pine trees are grown in Coniferous forests.
  - ▶ Black soil is best suited, for the cultivation of Cotton.
  - ▶ Homo sapiens is the scientific name of man
  - ▶ Polio, AIDS and Measles are caused by Virus
  - ▶ T.B., whooping cough and diphtheria are caused by Bacteria
  - ▶ In making of butter, cheese and yogurt we use Bacteria
  - ▶ Dead bodies of organisms are broken down into simpler molecules by natural decomposers called Bacteria and Fungi
  - ▶ Leeuwenhoek discovered bacteria in 1892
  - ▶ Goiter is caused by deficiency of Iodine
  - ▶ Fruit is formed from Ovary
  - ▶ Animals that feed on plants are called Herbivores
  - ▶ Man eat both plants and animals so called Omnivore
  - ▶ The type of environment an organism lives in is called Habitat
  - ▶ The enzymes that digest carbohydrates are called Amylase
  - ▶ Pepsin produced in stomach digests the Proteins
  - ▶ Bile is secreted by Liver
  - ▶ Duodenum is a part of Small Intestine
  - ▶ The right atrium of heart receives deoxygenated blood from the body via Vena Cava
  - ▶ DNA double helix model was given by Watson and Crick
  - ▶ Darwin gave the theory of evolution?
  - ▶ White blood cells are also known as
- Leucocytes
  - ▶ Red blood cells (RBC) are also known as Erythrocytes
  - ▶ Adrenaline hormone is secreted by gland Adrenal gland
  - ▶ Pituitary glands are located on Brain
  - ▶ Water transport in plants occur through Xylem
  - ▶ As a result of meiosis number of chromosome reduces to half
  - ▶ Post mortem examination of organ or tissue of a dead body is called Autopsy
  - ▶ Malaria is caused by Plasmodium
  - ▶ Tears are produced by Lachrymal glands
  - ▶ Penicillin was discovered by Alexander Fleming
  - ▶ RNA Stands for Ribonucleic Acid
  - ▶ Rise of blood sugar level above its normal level is called Hyper Glycemia
  - ▶ In human eye image is formed at Retina
  - ▶ Deficiency of iron can cause anemia
  - ▶ A kind of mental disorder in which a patient becomes victim of sound and visionary hallucination is called Schizophrenia
  - ▶ A colour blind person fails to distinguish Red from green
  - ▶ Bones of joints are held together by Tendons
  - ▶ Insulin treatment is given to people suffering from Diabetes
  - ▶ The formation of Red Blood Corpuscles (RBC) takes place in Bone marrow
  - ▶ Chemically an enzyme is a Protein
  - ▶ The largest organ of human body is Liver
  - ▶ An eye defect in which one cannot distinguish distant and



horizontal lines is called Astigmatism

- ▶ Oxygen is transported to every cell of body through Red Blood Cells
- ▶ The ductless and secretory glands in the human body are known as Endocrine glands
- ▶ The human organ affected by malaria attack is Spleen
- ▶ A man suffering from the bleeding of gums is advised to take Citrus fruits
- ▶ A reptile with a four-chambered heart is Crocodile
- ▶ Sex of a child is normally determined by the chromosome of Father only
- ▶ Fertilization means fusion of nuclei of male and female gametes
- ▶ The branch of Biology that deals with the study of the process of ageing is Herpetology
- ▶ Improvement of human race by genetic engineering is studied under Eugenics
- ▶ Whales breathe by Lungs
- ▶ Kangaroo is native animal of Australia
- ▶ Number of vertebrae in man is 33
- ▶ Food is stored as reserve fuel in Liver
- ▶ In lead pencil Graphite is used
- ▶ Helium, neon and argon are called Noble Gases
- ▶ Uranium radioactive element is used in making atomic bomb?
- ▶ Metals are good conductors of electricity.
- ▶ Copper is used in making brass, bronze and German silver.
- ▶ Percentage of aluminum in earth's crust is 7%
- ▶ Hydrogen atom does not have a neutron?
- ▶ The charge present on an electron is Negative
- ▶ The charge present on a proton is

Positive

- ▶ Everything which has weight and occupies space is called Matter
- ▶ Isotopes of an element have same number of protons but different number of Neutrons
- ▶ Hydrogen was discovered by Henry Cavendish
- ▶ Carbon dioxide was discovered by Van Helmont
- ▶ The word hydrogen means Water producer
- ▶ Gypsum is used to treat salinity.
- ▶ The bond formed by mutual sharing of electrons of bonded atoms is called Covalent
- ▶ The chemical formula of silicon is  $\text{SiO}_2$
- ▶ Limestone dolomite and magnetite are common minerals of Carbon
- ▶ Most abundant element in human body is Oxygen
- ▶ Symbol of sodium is Na
- ▶ Chemical formula of table salt is NaCl
- ▶ Fluorine is used to prevent tooth decay.
- ▶ Symbol of Iron is Fe
- ▶ Gallium metal is having such a low melting point that it can melt in your hand
- ▶ Bromine (non-metal) is liquid at room temperature
- ▶ Oxygen is prepared on a large scale from Air
- ▶ Carbon dioxide is used as a fire extinguisher
- ▶ Graphite substance is used as a lubricant
- ▶ Burning of wax is a chemical change
- ▶ Nitrous oxide and Sulphur dioxide are responsible for acid rain
- ▶ In the manufacturing of Vanaspati Ghee Hydrogen gas is used



- ▶ Polygenic inheritance with environmental influence is called Multifactorial.
- ▶ More than two alternate forms of a gene which arise by gene mutation is called Multiple alleles.
- ▶ More than two alternate forms of a gene which arise by gene mutation is called Multiple alleles.
- ▶ An agent that induces changes in DNA; includes physical agents that damage DNA and chemicals that alter DNA bases is called Mutagen.
- ▶ Who gave the Laws of Natural Selection? Darwin
- ▶ Blood sugar level is controlled by hormone called Insulin
- ▶ A mutated gene, alternatively an organism carrying a gene that has undergone a mutation is called Mutant.
- ▶ A permanent change in the cell's DNA; includes changes in nucleotide sequence, alteration of gene position, gene loss or duplication and insertion of foreign sequences is called Mutation.
- ▶ A red pigment that store oxygen within the muscle cell is called Myoglobin.
- ▶ The synapse formed between a motor neuron and a muscle fiber is called Neuromuscular junction.
- ▶ The average human heart completes how many cycles in one minute. 70-110
- ▶ What is the production of cancer? Carcinogen
- ▶ Nucleotides consist of three parts: phosphate, five carbon (pentose) sugar and nitrogen-containing base
- ▶ The two major types of nucleic acid are DNA and RNA
- ▶ The five common bases in nucleic acids are adenine, guanine, cytosine, thymine and uracil
- ▶ In human cells, most of the DNA is found in the Nucleus
- ▶ RNA is a nucleic acid that is usually single-stranded.
- ▶ In DNA, the four bases that are found are A; T; C and G
- ▶ The three most abundant types of RNA are messenger; transfer and ribosomal RNA
- ▶ Steroids are lipids with four rings.
- ▶ Eicosanoids are lipids that contain 20 carbons.
- ▶ Proteins are made of amino acids joined together in a chain.
- ▶ A Phospholipid is formed by replacing one fatty acid in a triglyceride with a phosphorouscontaining molecule.
- ▶ Triglycerides consist of three fatty acids joined to a molecule of glycerol
- ▶ The four major classes of macromolecule are proteins, lipids, carbohydrates and nucleic acids
- ▶ Macromolecules are formed in dehydration (or dehydration synthesis) reactions, in which two hydrogen and an oxygen (H<sub>2</sub>O) are removed from the reactants.
- ▶ When a macromolecule is broken down into smaller molecules, a molecule of water is added and the reaction is called hydrolysis
- ▶ The bonds between the subunits in a protein are called peptide bonds.
- ▶ The Primary structure of a protein refers to the actual sequence of its subunits.
- ▶ The tertiary structure of a protein refers to the complex folding caused by interactions between the side chains of the subunits with each other and with the solvent.
- ▶ The quaternary structure of a protein refers to the interaction of two separate protein molecules to form a single functional unit.
- ▶ The Secondary structure of a protein refers to the folding caused by hydrogen bonding between amino and carboxyl groups within the same



- ▶ The chemical name of laughing gas is Nitrous oxide
- ▶ Hydrogen is the lightest element of the periodic table
- ▶ Titanium element is found on the surface of the moon
- ▶ Helium is used for respiration in deep water instead of Nitrogen because it is lighter than Nitrogen
- ▶ The mass of Neutron is approximately equal to the mass of a proton
- ▶ Carbon dioxide gas is used in soda water
- ▶ Graphite (form of Carbon) is good conductor?
- ▶ Propane is the main constituent of Liquid Petroleum Gas (LPG)
- ▶ Anesthesia refers to methods that cause a loss of sensation particularly the loss of pain.
- ▶ Removal of damaged or seriously diseased part of limb of body is called Amputation
- ▶ Acupuncture is a method of Chinese traditional healing involving the insertion of a fine needle beneath skin and moved by rotation to get relief of symptoms.
- ▶ Amnesia is condition of loss of memory partial or total.
- ▶ Arthritis is inflammation of joints or spine, cause pain and swelling.
- ▶ Athlete's foot is fungal infection of the skin, particular between the toes caused by ringworm.
- ▶ Atherosclerosis is fatty deposition to inner walls of arteries.
- ▶ Bell's Palsy is paralysis of facial muscles caused by infection or inflammation.
- ▶ Botulism is food poisoning caused by anaerobic bacteria clostridium botulism.
- ▶ Radiography is technique of examining the body through x-rays.
- ▶ Systole is condition of contraction of heart muscles.
- ▶ Diastole is condition of relaxation of heart muscles.
- ▶ Gerontology is scientific study of ageing and diseases that affect the aged.
- ▶ Electroencephalograph is a technique that is used to record brain structure or activity.
- ▶ Which disease was once known as white plague? Tuberculosis
- ▶ Dr. James Watson discovered the structure of DNA in 1953.
- ▶ Structure of DNA was given by Watson and Crick.
- ▶ Ichthyology in the study of fish.
- ▶ Psychological study of life in artificial environment is called biopsychology.
- ▶ Forms and features are studied under the branch of Morphology.
- ▶ Paleontology is the study of fossils.
- ▶ Phycology is the study of Algae.
- ▶ Mycology is the study of fungi.
- ▶ 'Parkinson' is a disease of Brain.
- ▶ The normal pulse beat of a human body is between 72—80.
- ▶ "Psoriasis" is a common skin condition that causes skin redness and irritation.
- ▶ "Autopsy" is the Post-Mortem examination of a body.
- ▶ Kidneys organ of the body purifies the blood
- ▶ The average thickness of the earth's crust is 32km.
- ▶ Best source of protein? Fish
- ▶ Microphone is used to convert sound waves into electrical energy.
- ▶ Penicillin is widely used as an antibiotic
- ▶ The air we inhale is mixture of gases.



Which of the following gases in the mixture is highest in percentage?  
Nitrogen

- ▶ The world's largest internet user's country is China.
- ▶ The world's largest internet search engine is Google.
- ▶ Steel is more elastic than Rubber
- ▶ The chief constituent of gobar gas is methane
- ▶ Drinker's apparatus: to help breathing in infantile paralysis.
- ▶ Dynamo: The origin of electricity in a Dynamo is the transformation of mechanical energy into electrical energy.
- ▶ Epidiascope: for projecting films as well as images of opaque articles on a screen.
- ▶ The life history of human malaria parasite in Anopheles was first described by Ronald Ross
- ▶ The element common to all acids is Hydrogen.
- ▶ LSD is a Narcotic drug.
- ▶ Vernalization is a 'technique of Plant treatment.
- ▶ Newton gave his famous law of gravitation.
- ▶ Mendeleev made the most significant contribution towards the classification of elements. He arranged the elements, then known in the order of their increasing atomic weights in the form of a table (Mendeleev's Periodic Table).
- ▶ Mendel gave laws of heredity.
- ▶ "Plague" is a disease, which spreads by rat.
- ▶ "Amino Acid" is the smallest unit of Protein.
- ▶ "Cataract" is the disease of Eye and also a huge water fall.
- ▶ When heavy unstable elements split into relatively smaller elements

alongwith the release of energy is called fission.

- ▶ An abnormal paleness in the skin is called Pallor
- ▶ What is apoplexy? Cerebral Stroke
- ▶ What is the largest artery of the body? Aorta
- ▶ The coronary arteries supply blood to the Heart muscle
- ▶ Series of stages by which a zygote becomes an organism or by which an organism changes during its life span; includes puberty and aging for example is called Development.
- ▶ A person who can perceive only two primary colours is called Dischromat;
- ▶ The enzyme that links together Okazaki fragments in DNA replication of the lagging strand. It also links other broken areas of the DNA backbones is called DNA ligase.
- ▶ An allele that is expressed both in the heterozygous and the homozygous condition is called Dominant.
- ▶ A congenital syndrome caused by the presence of an extra copy of chromosome 21 is called Down's syndrome.
- ▶ A steroid hormone produced by arthropoda that induces moulting and matamorphosis is called Ecdysone.
- ▶ Pictorial graph representing biomass, organism number, or energy content of each trophic level in a food web from the producer to the final consumer populations is called Ecological pyramid.
- ▶ Purity of milk is measured by instrument called Lactometer
- ▶ Dendrology is the study of trees.
- ▶ Histology deals with organic tissues
- ▶ A biological community together with the associated abiotic environment is called Ecosystem.
- ▶ Study of animal development from



fertilized egg to formation of all major organs is called Embryology.

- ▶ A species that is in imminent danger of extinction through out its range is called Endangered species.
- ▶ An animal's organ system for cell-to-cell communication composed of hormones and the cells that secrete them and receive them is called Endocrine system.
- ▶ The nutritive inner lining of uterus is called Endometrium.
- ▶ An outer layer of cells in the embryo of an amniote that forms from the proliferation and movement of cells of the blastoderm is called Epiblast.
- ▶ A hormone, secreted by the adrenal medulla, that is released in response to stress and that stimulates a variety of responses, including the release of glucose from skeletal muscle and an increase in heart rate is called Epinephrine.
- ▶ A gene interaction in which an effect caused by a gene at one locus interferes with or hides the effect caused by another gene at another locus is called Epistasis.
- ▶ The study of animal behavior in natural or near natural conditions is called Ethology.
- ▶ A plant hormone that promotes the ripening of fruits and the dropping of leaves and fruits is called Ethylene.
- ▶ That portion of a eukaryotic chromosome that is transcribed into RNA; contains active genes that are not tightly condensed during interphase is called Euchromatin.
- ▶ A cell characterized by membrane bounded nucleus and the one that possesses chromosomes whose DNA is associated with proteins, an organism composed of such cells is called Eukaryote.
- ▶ Change over time; organic or biological evolution is a series of changes in the genetic composition of a population

over time is called Evolution.

- ▶ The level of classification between order and genus is called Family.
- ▶ Any remains, impressions or traces of organisms of a formal geological age is called Fossils.
- ▶ On some receptor neurons, a finely branched ending that responds to touch and pressure, to heat and cold, or to pain; produces the sensations of itching and tickling is called Free nerve ending.
- ▶ The embryological process that results in the formation of the gastrula. It eventually results in the formation of the embryonic gut (endoderm), ectoderm and mesoderm is called Gastrulation.
- ▶ Sum of all the genes/alleles found in all members of a breeding population at a given time is called Gene pool.
- ▶ The basic unit of heredity. A sequence of DNA nucleotides on a chromosome that encodes a protein tRNA or rRNA molecules or regulates the transcription of such a sequence is called Gene.
- ▶ The entire DNA sequence of an organism is called Genome.
- ▶ A collection of bacterial or bacteriophage clones, each clone containing a particular segment of DNA from the source cell is called Genomic library.
- ▶ The science of studying the DNA sequences and properties of entire genomes is called Genomics.
- ▶ The genetic constitution underlying a single trait or set of traits is called Genotype.
- ▶ Level of classification between species and family is called Genus.
- ▶ A plant hormone that stimulates seed germination, fruit development and cell division and elongation is called Gibberellins.
- ▶ A cell of the nervous system that provides support and insulation for neurons is called Glial cell.



- ▶ A cuplike structure that is the initial (proximal) portion of a nephron; where pressure filtration occurs is called Glomerular capsule.
- ▶ A capillary network within a glomerular capsule of a nephron is called Glomerules.
- ▶ The most crippling arthritis is an autoimmune disease involving severe inflammation of the joints is called Gouty arthritis.
- ▶ Growth with respect to the direction of gravity is called Gravitropism.
- ▶ A dark, arching band that forms on the surface of the amphibian zygote opposite the point of sperm penetration – forms in the region where gastrulation will occur is called Gray-crescent.
- ▶ Simple learning characterized by a decline in response to a harmless, repeated stimulus is called Habituation.
- ▶ Having only one set of chromosomes ( $n$ ) in contrast to diploid ( $2n$ ) is called Haploid.
- ▶ A group of hereditary diseases characterized by failure of the blood to clot is called Hemophilia.
- ▶ The portion of eukaryotic chromosome that is not transcribed into RNA, remains condensed in interphase and stains intensely in histological preparations is called Heterochromatin.
- ▶ An organism that cannot synthesize organic compounds from inorganic substances and, therefore, must take in performed food is called Heterotrophy.
- ▶ Having two different alleles of the same genes. The term is usually applied to one or more specific loci as in "heterozygous with respect to the  $W$  locus" (that is the genotype is  $W/w$ ) is called Heterozygous.
- ▶ Frequency diagram is called Histogram.
- ▶ One of a group of relatively small, very basic polypeptides rich in arginine and lysine, forming the core of nucleosomes around which DNA is wrapped in the first stage of chromosome condensation is called Histone.
- ▶ A sequence of 180 nucleotides located in homeotic genes that produces a 60-amino acid peptide sequence (the homeodomain) active in transcription factor is called Homeobox.
- ▶ The maintenance of internal conditions in a cell or an organism by means of a self-regulation mechanism is called Homeostasis.
- ▶ An animal (bird or mammal) that maintains a uniform body temperature independent of the environmental temperature is called Homeotherm.
- ▶ One of a series of "master switch" genes that determine the form of segments developing in the embryo is called Homeotic gene.
- ▶ One of a pair of chromosomes of the same kind located in a diploid cell; one copy of each pair of homologous comes from each gamete that formed the zygote is called Homologous chromosome (homologue).
- ▶ Describes structures that have common evolutionary origin is called Homology. The wing of a bat and the arms of human are homologues.
- ▶ Being a homozygote having two identical alleles of the same gene is called Homozygous. The term is usually applied to one or more specific loci as in "homozygous with respect to the locus  $W$ " (that is the genotype is  $W/W$  or  $w/w$ ).
- ▶ A molecule usually a peptide or steroid, that is produced in one part of an organism and triggers a specific cellular reaction in target tissues and organs some distance away is called Hormone.
- ▶ The skeleton composed of fluid held under pressure in close body compartment is called Hydrostatic skeleton.
- ▶ A solution having higher solute concentration (less water) than the cytoplasm of a cell; causes cell to lose



water by osmosis is called Hypertonic solution.

- ▶ A part of the brain that helps to regulate the internal environment of the body; involved in control of heart rate, body temperature, water balance, and glandular secretions of the stomach and pituitary gland is called Hypothalamus.
- ▶ A solution having lower solute concentration (more water) than the cytoplasm of a cell; causes cell to gain water by osmosis is called Hypotonic solution.
- ▶ The process of learning by which an animal forms an association with another animal or object in the environment during a sensitive period of development, usually shortly after birth, or being hatched is called Imprinting.
- ▶ One of several proteins involved in the formation of an initiation complex in prokaryote polypeptide synthesis is called Initiatory factor.
- ▶ A complex form of learning that requires the manipulation of mental concepts to arrive at adaptive behavior is called Insight learning.
- ▶ The period between two mitotic or meiotic divisions in which a cell grows and its DNA replicates; includes G<sub>1</sub>, S and G<sub>2</sub> phases is called Interphase.
- ▶ A reversal in order of a segment of a chromosome is called Inversion.
- ▶ The morphology of chromosomes of an organism as viewed with a light microscope is called Karyotype.
- ▶ Disc-shaped protein structure within the centromere to which the spindle fibres attach during mitosis or meiosis is called Kinetochore.
- ▶ Enzyme that joins together two molecules in an energy dependent process. DNA ligase for example, joins two DNA molecules together end to end through phosphodiester bonds is called Ligase.
- ▶ Phenomenon of staying together of all the genes of a chromosome is called

Linkage.

- ▶ The position of a gene on the chromosome is called Locus.
- ▶ A receptor that responds to mechanical deformation, such as that caused by pressure, touch, or vibration is called Mechanoreceptor.
- ▶ The part of the hindbrain of vertebrates that controls automatic activities such as breathing, swallowing, heart rate, and blood pressure is called Medulla.
- ▶ A hormone, released by the anterior pituitary, that regulates the activity of skin pigments in some vertebrates is called Melanocyte-stimulating hormone.
- ▶ A hormone, secreted by the pineal gland, that is involved in the regulation of circadian cycles is called Melatonin.
- ▶ A hormone that is secreted by the pineal gland and that reverses the darkening effect of melanocyte-stimulating hormone by causing aggregation of the melanin granules in the melanocytes is called Melanotinin.
- ▶ Three layers of connective tissue that surround the brain and spinal cord is called Meninges.
- ▶ The stage of mitosis or meiosis during which the microtubules become organized into a spindle and the chromosomes come to lie in the spindle's equatorial plane is called Metaphase.
- ▶ During development, the central portion of the brain; contains an important relay centre, the reticular formation is called Midbrain.
- ▶ The study of biochemical structures and function of organisms at molecular level is called Molecular biology.
- ▶ A person who can perceive only one primary colour is called Monochromat.
- ▶ A stage in the embryonic development of some animals that consists of solid ball of cells (blastomeres) is called Morula.



molecule, and usually leads to the formation of beta-pleated-sheets and alpha-helices.

- ▶ When a protein unfolds, its function is lost: this process is called denaturation
- ▶ Histones have abundance of amino acids? Arginine and lysine
- ▶ A portion of chromatin that is condensed only during cell division is Euchromatin
- ▶ Transfer of genetic material from one cell to another that can alter the genetic makeup of recipient cell is called Transduction
- ▶ Who discovered DNA? Friedrich Miescher
- ▶ DNA contains? Purines (A and G) pyrimidines (T and C)
- ▶ DNA has a helical shape with the diameter of? 2 nm
- ▶ In semi-conservative replication? Sequence of original duplex is conserved after one round of replication
- ▶ The true E.Coli replicating enzyme is DNA polymerase III
- ▶ Rate of DNA replication by DNA polymerase is? 1000 nucleotides / sec
- ▶ Lagging strand is constructed discontinuously? 100-200 nucleotides
- ▶ The sequence of nucleotides that determines the amino acid sequence of a protein is? Gene
- ▶ Central dogma is? Basic mechanism of reading and expressing genes
- ▶ In prokaryotes there are three types of DNA polymerases and one type of RNA polymerase
- ▶ Human cell contains \_\_\_\_\_ different kinds of tRNA molecules? 45
- ▶ In mitochondria UGA is/specified as? Tryptophan
- ▶ Three nucleotide sequence on tRNA that specifies an amino acid is? Anticodon
- ▶ Initiation complex in translation is composed of? Ribosome and aminoacyl-tRNA
- ▶ Examples of chromosomal aberrations are Sickle cell anemia & Phenylketonuria
- ▶ Point mutations are represented as? Alteration in sequence of DNA nucleotide
- ▶ Strand of DNA which is not transcribed is called Coding
- ▶ Phenylketonuria is due to deficiency of? Phenylalanine hydroxylase
- ▶ Molecular basis of sickle cell anaemia was found by? Vernon Ingram
- ▶ 200 nucleotides in one nucleosome
- ▶ Sex chromosomes were 1<sup>st</sup> discovered in? Fruitfly
- ▶ A sugarcane cell has \_\_\_\_\_ chromosomes? 80
- ▶ Centromere represents? Primary constriction
- ▶ Which of the following can kill mice if injected separately? Live S type pneumococcus
- ▶ X-Ray diffraction pattern of DNA was prepared by? Rosalind Franklin
- ▶ In sickle cell Hb, which chain is affected? Beta Chain
- ▶ Period between two consecutive divisions is called? Interphase
- ▶ DNA is synthesized and chromosome number is doubled in? S phase
- ▶ In case of neurons, post mitotic cell escapes cell cycle and remain in \_\_\_\_\_ phase without proliferating further? G<sub>0</sub> phase
- ▶ In human, cell cycle is about 24 hrs
- ▶ Mitosis occurs in? diploid and haploid cells
- ▶ Microtubules are composed of? Tubulin protein and traces of RNA
- ▶ From each pair of centrioles \_\_\_\_\_ sets of microtubules originate? 3



- ▶ Mitotic apparatus in animals is formed by? Aster and spindle
- ▶ A special area of centromere with specific base arrangement and specific proteins where spindle fibers are attached is called Kinetochore
- ▶ Each kinetochore gets \_\_\_\_\_ fibers in mitosis? 2
- ▶ Most critical phase of mitosis is? Anaphase
- ▶ Reverse of prophase is? Telophase
- ▶ In plants mitotic apparatus consists of? Spindles only
- ▶ Spread of tumor cells and establishment of secondary areas of growth is? Metastasis
- ▶ Which is a feature of malignant tumor? Metastasize
- ▶ Feature of cancer cells in common? (A. High nucleus to cytoplasmic ratio B. Prominent nucleoli C. Many mitosis)
- ▶ Meiosis occur in diploid cells only
- ▶ Meiosis occurs at the time of gamete formation in animals and spore formation in plants
- ▶ Interphase of meiosis lacks? G2 phase
- ▶ Homologous chromosomes are? Similar but not identical
- ▶ The longest phase of meiosis I is? Prophase
- ▶ Tetrad or bivalent is? Paired homologous chromosome but not fused complex structure
- ▶ Pairing of homologous chromosomes is completed in? Pachytene
- ▶ Each bivalent has? 4 chromatids
- ▶ Crossing over occurs between? Non sister chromatids
- ▶ Inability of chromosomes to segregate during anaphase and telophase of meiosis is called Chromosomal nondisjunction
- ▶ Down's syndrome involves autosome
- ▶ In Turner's syndrome  $2n-1$
- ▶ In Klinefelter's syndrome XYY
- ▶ Apoptosis? Internal programme of events by which cell commits suicide
- ▶ A cell of human being has 46 chromosomes; it divides to form some daughter cells, each having 23 pairs of chromosomes. The division would be? Mitosis
- ▶ Mitosis takes place during? Healing of wound, Development and growth and vegetative propagation
- ▶ Which of the following category comes under Turner's syndrome? A female having only 1 X chromosome
- ▶ Morphology of chromosomes is best studied during? Metaphase
- ▶ Cytokinins refers to? Division of cell
- ▶ Which fibers interdigitate with each other? Polar fibers
- ▶ Cancer cells are? Less differentiated
- ▶ Crossing over in meiosis occurs during? Pachytene
- ▶ Which division does not show replication of chromosomes? Meiosis II
- ▶ A significant happening of meiosis is / are (Crossing over & Random assortment)
- ▶ Jacob's syndrome can be represented as? XYY
- ▶ In which of the following cases, genotypic and phenotypic ratio will remain same in F<sub>2</sub> generation? Incomplete dominance
- ▶ A pure breeding tall pea plant was crossed to dwarf plant what will be the frequency of dwarf plants in F<sub>1</sub>? 0
- ▶ In question number 2 what will be frequency of dwarf plant in F<sub>2</sub>? 0.25
- ▶ How many pairs of homologous chromosomes are present in *Pisum sativum*? Seven pairs
- ▶ Which of the following characters of pea plant is dominant? Axial flowers



- ▶ A pea plant with yellow seed was crossed to a plant having green seeds. What will happen in F<sub>1</sub>; if plants are true breeding? All seeds will be yellow
- ▶ The position of a gene on chromosome is called? Locus
- ▶ Filial is a Latin word. It means? Progeny
- ▶ Which of the following condition is hybrid? Tt
- ▶ Which of the following is monohybrid cross? TT x tt
- ▶ A pure breeding tall plant was crossed to dwarf plant. What would be probability of "Tt" genotype in F<sub>2</sub>? 0.5
- ▶ A monohybrid cross yielded 3:1 in F<sub>2</sub>. What could be mode of inheritance? Segregation
- ▶ If a heterozygous individual shows the complete effect of both alleles, the type of inheritance would be? Co-Dominance
- ▶ The gene which controls ABO group has how many alleles in an individual? Three
- ▶ How many genes control Rh blood group system? Three
- ▶ A man with blood group "A" marries a woman of blood group "B". Both are heterozygous. What is the off-springs having phenotype "O"? 25%
- ▶ Deficiency of Vitamin C causes Teeth disease
- ▶ Who gave the Theory of Evolution? Darwin
- ▶ Who gave the Laws of Heredity? Gregory Mandel
- ▶ The trait "Kernel colour in corn" is controlled by how many pairs of genes? Three pairs
- ▶ Baldness is most frequent in? Men
- ▶ In nature, Garden pea is? Self-fertilized
- ▶ The genes which do not follow law of independent assortment? Linked genes
- ▶ Phenotype represents? Morphology
- ▶ During test cross, if all off springs are phenotypically dominant then parents are? Homozygous
- ▶ True breeding variety is produced by? Self fertilization
- ▶ Which of the following is universal donor? O
- ▶ Inheritance in man is traced by? Pedigree method
- ▶ Skin colour in man is controlled by? 4 pairs
- ▶ Which of the following blood group is always heterozygous? AB
- ▶ Interaction between genes occupying different loci is? Epistasis
- ▶ Genes that affect growth rate in humans influencing both weight and height are? Pleiotropy
- ▶ The number of linkage groups in humans is? 23
- ▶ Recombination frequency between two linked genes can be calculated by? Back cross
- ▶ Which of the following is male determining gene in humans? SRY
- ▶ It was discovered by J. Seiler in 1914 in moth? ZZ-ZW
- ▶ Haemophilia B is due to abnormality of factor? IX
- ▶ Gene for blue opsin is present on chromosome? 7
- ▶ Most common type of Diabetes mellitus is Type II
- ▶ Chemically auxins are Indole acetic acid.
- ▶ Gibberellins may be substituted for \_\_\_\_\_ light, therefore promote flowering in long day plants? Red
- ▶ Which of the following is antagonist to Auxin in terms of promotion of stem growth? Absciscic Acid
- ▶ Absciscic acid promotes flowering in short day plants and inhibits in long day plants, which is antagonistic to absciscic



- acid in terms of flowering? Gibberellins
- ▶ The only promoter of leaf senescence in the following plant hormones is? Absciscic Acid
  - ▶ Which of the following is used in brewing industry to promote malting? Gibberellins
  - ▶ Which type of the receptors are present in the ear? Mechanoreceptors
  - ▶ Type of sensations carried by nociceptors are? Pain
  - ▶ Which type of sensory structures carrying the touch sensations are present in papillae extending into ridges of the fingertips? Meissner's Corpuscles.
  - ▶ Which type of sensory structures carry deep pressure and vibration sensations? Pacinian corpuscles
  - ▶ Nissl's granules are present in which part of the neuron? Soma.
  - ▶ Neurons not only conduct impulses but also generate them.
  - ▶ Neurons are not the only cellular component of nervous system.
  - ▶ Neurons may show limited regenerative capabilities
  - ▶ Type of neurons found exclusively in CNS are? Associative neurons
  - ▶ Maintenance of normal resting potential via movement of  $K^+$  inside the cell and  $Na^+$  out is a/an \_\_\_\_\_ process? Active
  - ▶ At the induction of action potential opening of  $Na^+$  gate with influx of  $Na^+$  is a \_\_\_\_\_ processes? Passive transport
  - ▶ Normal action potential of a neuronal cell is? plus 50 mv
  - ▶  $Na^+ - K^+$  ATPase pump is important for? Recovery of resting potential
  - ▶ Maximum speed of nerve impulse transmission is? 120m/sec
  - ▶ Hydra has no central nervous system
  - ▶ Which of the following are responsible for the detection of changes in environment? Receptors
  - ▶ Muscles & Glands are effectors
  - ▶ Any change in the environment of an organism is called? Stimulus
  - ▶ Hydra has Neuron-cells
  - ▶ Co-ordination in man is brought about by Nervous system & Endocrine system
  - ▶ Which of the following transmits nerve impulse from receptors to central nervous system? Sensory neuron
  - ▶ In which of the following neurons length of dendrite is greater than axon? Sensory neuron
  - ▶ Which of the following neuron has a single long dendron? Sensory neuron
  - ▶ Which of the following cytoplasmic extensions carry the message toward the cell body? Dendrites
  - ▶ Microscopic gaps between the neuron endings are called Synapses
  - ▶ What is the function of synapse? To decrease the speed of nerve impulse
  - ▶ Under resting membrane potentials? Outer surface of neuron is more positive
  - ▶ Which of the following ions are involved in the initiation of nerve impulse?  $Na^+$
  - ▶ Reflex actions below the neck are under control of? Spinal cord
  - ▶ Central nervous system of man consists of Brain & Spinal cord
  - ▶ Which of the following is largest part of brain? Cerebrum
  - ▶ Which of the following is present inside the vertebral column? Spinal cord
  - ▶ Intelligence is under the control of? Cerebrum
  - ▶ Which of the following is second largest part of the brain? Cerebellum
  - ▶ Which of the following acts as thermo-regulator? Hypothalamus



- ▶ Which of the following allows precise muscular movements? Cerebellum
- ▶ Receptors for hearing come under heading of Mechanical
- ▶ It is one of the convulsive disorders of nerves which are characterized by abrupt transient symptoms of motor, sensory, psychic or autonomic nature? Epilepsy
- ▶ Which of the following feature is not related to neuron? Regeneration
- ▶ Value of resting membrane potential is 0.07 V
- ▶ Number of pairs of cranial nerves is 12
- ▶ Insufficient secretion of iodothyroxine in adults causes? Myxedema
- ▶ Insulin and glucagons are \_\_\_\_\_ in nature? Protein
- ▶ Acromegaly is caused due to oversecretion of Thyroxin
- ▶ MSH is produced from Median pituitary
- ▶ Grave's disease is produced due to Overproduction of thyroxin
- ▶ Secretin is a hormone produced by Duodenum
- ▶ Types of behaviour enabling pillbugs to reach moist area is Kinesis
- ▶ Darwin was first to propose an objective definition of instinct.
- ▶ Habituation is simplest form of learning.
- ▶ Unbroken series of organisms arranged from ancestor to descendant sequence is Phyletic lineage
- ▶ Out of total organisms on earth, \_\_\_\_\_ are vascular plants? 17.60%
- ▶ Control of organisms by using living organisms is called Biological control
- ▶ Branch of biology which deals with the study of chemical components and chemical processes in living organisms is called Biochemistry
- ▶ C-H bond is the potential source of chemical energy for cellular activities
- ▶ Which vitamin is essential for coagulation of blood? K
- ▶ Deficiency of Vitamin A causes night blindness
- ▶ Percentage of water in brain cells is 85%
- ▶ Breakdown of large molecules into smaller ones utilizing water molecules is Hydrolysis
- ▶ A chemical substance that reacts with enzyme but is not transformed into product and thus blocking active site is called Inhibitor
- ▶ Intake of liquid material by cell membrane is called Pinocytosis
- ▶ Ribosomes were discovered by Palade
- ▶ Golgi complex is concerned with cell secretions
- ▶ Cytoskeleton involved in assembly and disassembly of the spindle during mitosis is of Microtubules
- ▶ Reverse transcriptase is present in all retroviruses
- ▶ Pox viruses are DNA enveloped
- ▶ Bacteria which grow either in the presence or absence of oxygen? Facultative bacteria
- ▶ Destruction of all life forms is called Sterilization
- ▶ Ergotin is used to relieve one kind of headache, migraine
- ▶ The single healthy megaspore retained within the megasporangium germinates to form an egg containing female gametophyte called Embryo sac
- ▶ Pollen grains in pinus have \_\_\_\_\_ for dispersal through wind? Wings
- ▶ Double fertilization is feature of Angiosperms





- ▶ Filtration is the passage of liquids and solutes through membranes due to differences in pressure, a process which is important in the kidney.
- ▶ When energy is being used to move a solute from low to high areas of concentration, the process is called active transport
- ▶ The concentration of sodium is highest outside the cell, while for potassium, the reverse is true.
- ▶ Sodium and potassium gradients are maintained by an active-transport protein called the sodium-potassium pump, which moves 3 sodiums out of the cell for every 2 potassium ions brought in.
- ▶ In Exocytosis interactions between vesicle proteins and plasma membrane proteins cause a vesicle to merge with the plasma membrane and discharge its contents to the cell's exterior.
- ▶ A difference in the number of positive and negative charges on the two sides of a membrane is referred to as the membrane potential
- ▶ The two factors that act in opposite ways to stabilize the resting membrane potential are concentration gradients (or diffusion) and electrostatic attraction
- ▶ The two major ions responsible for the membrane potential in human cells are sodium and potassium
- ▶ The glycocalyx is composed of carbohydrate molecules (a class of macromolecule) attached to proteins and lipids on the cell surface.
- ▶ Cells sense contact with other cells and with surfaces, and adhere to substrates and other cells, largely via the use of carbohydrate-rich macromolecules in the cell membrane which together compose the glycocalyx
- ▶ The three major signal types recognized by membrane receptors are chemical signals, electrical signals, and contact
- ▶ A common function of all membrane receptors is to transmit an external event, as a signal, into the cell to allow the cell to respond.
- ▶ The entire region between the cellular nucleus and the membrane is called the cytoplasm, the liquid portion is called the cytosol and the membrane-enclosed compartments in which specific functions are localized are called organelles
- ▶ Mitochondria have two membranes, each of which is a bilayer.
- ▶ The innermost membrane of mitochondria is folded, forming wrinkles called cristae
- ▶ The three principle components of the cytoskeleton are microfilaments, intermediate filaments, and microtubules
- ▶ If a particle in the cell's cytoplasm can be seen with light microscopy, it is called an inclusion
- ▶ The major (not only) function of mitochondria is to completely oxidize fuels and to capture the energy in a molecule called ATP
- ▶ Ribosomes are huge macromolecules composed of RNA and protein, whose function is to synthesize protein.
- ▶ Cytosolic proteins are made by free ribosomes, while proteins destined for export, or use in membrane, are made by membrane bound (or ER bound) ribosomes?



- ▶ The rough endoplasmic reticulum is distinguished by the presence of Ribosomes on its surface, and is responsible for making integral membrane proteins, secreted proteins, and phospholipids.
- ▶ Ribosomes become bound to the membrane of the rough ER after they have started making protein due to the presence of a(n) signal sequence on the newly made protein which binds to receptors called SRPs (Signal Recognition Particles) on the ER surface.
- ▶ The function of the smooth ER varies greatly from cell type to cell type, and can include lipid metabolism, steroid synthesis, calcium storage and release, and others.
- ▶ Proteins leaving the rough ER are transported to the Golgi apparatus for modification, packaging, and transport to the appropriate location.
- ▶ The series of organelles that are able to exchange membrane components with one another are collectively known as the endomembrane system
- ▶ The organelles within the cell whose main functions are digestion and hydrolysis are the Lysosomes
- ▶ The organelles which isolate hazardous chemical reactions within the cell, especially those producing free radicals, are called Peroxisomes
- ▶ The primary functions of Microfilaments are to brace and strengthen the cell's surface and to attach to cellular adhesion molecules which allow binding to substrates and other cells.
- ▶ The semi-permanent structural framework of the cell which transmit force from one point in the membrane to others, allowing cells to spread a stretching force across a wide region and to other cells, are the intermediate filaments
- ▶ The dynamic, hollow tubes which help to determine the overall shape of the cell and along which
- as if on a conveyor belt are the microtubules
- ▶ The molecules which use energy from ATP to move organelles along certain components of the cytoskeleton are called motor molecules
- ▶ The function of the nuclear membrane is to regulate which materials enter or leave the nucleus.
- ▶ Large molecules are transported into or out of the nucleus through nuclear pores
- ▶ Ribosomal RNA is produced in nucleoli
- ▶ In humans, DNA is the chemical which contains the original sequence information encoding proteins and other cellular components, and which is the 'master copy' that is passed on to future generations.
- ▶ In humans, mRNA is a disposable copy of the nucleic acid sequence which contains the information encoding proteins and other cellular components. It is used by the ribosomes in the cytoplasm to create a protein with the correct amino acid sequence.
- ▶ tRNA is a form of RNA that carries amino acids to the ribosome during protein synthesis.
- ▶ rRNA is a form of RNA that is a physical component of the ribosome.
- ▶ DNA is made by enzymes called DNA polymerases
- ▶ During DNA synthesis, new nucleotides can only be added to the 3' end of the DNA.
- ▶ The structure of DNA is anti-parallel, meaning that the strands are parallel, but pointed in opposite directions
- ▶ The lagging strand of DNA is made discontinuously (in small pieces).
- ▶ DNA wrapped around histones within the nucleus is called chromatin
- ▶ A hereditary nucleic acid sequence



agene

- ▶ Translation occurs in which part of the cell? Cytoplasm.
- ▶ Non-functional organelles are degraded by lysosomes
- ▶ Proteins which are no longer functional are marked for degradation by the addition of ubiquitin
- ▶ The extracellular matrix is an organized, extracellular mesh of varying density in which cells are found.
- ▶ The study of large body structures is called gross anatomy.
- ▶ The study of a body area such as the foot is called regional anatomy.
- ▶ The study of an organ system's structure is called systemic anatomy.
- ▶ The study of the relationship between internal structure and surface features of the body is called surface anatomy.
- ▶ Microscopic anatomy is the study of small body structures, often too small to be seen with the naked eye.
- ▶ Histology is the study of tissues, and cytology is the study of cells.
- ▶ The study of changes in the body's structure over time is called developmental anatomy: a specialized sub-field that deals with such changes prior to birth is called embryology
- ▶ One common way to organize physiological knowledge is to classify it by organ system
- ▶ Physiology is the study of the body's function, often at the cellular or molecular level.
- ▶ Atoms combine to form molecules
- ▶ An organ is made of several types of tissue
- ▶ Organs working together on a common task form an organ system
- ▶ The integumentary system forms the external body covering.
- ▶ The integumentary system protects deeper tissues from injury.
- ▶ The principle which allows us to (in many cases) infer the function of a component of the body based on its structure, and vice versa, is the Principle of Complementarity
- ▶ Tissues consist of similar types of cells
- ▶ The skeletal system protects and supports body organs.
- ▶ The skeletal system houses the blood-forming cells of the body.
- ▶ The skeletal system stores minerals which may be used as needed.
- ▶ The muscular system is a major source of heat (allowing us to maintain body temperature).
- ▶ Organs of the endocrine system secrete chemicals called hormones into the blood.
- ▶ The endocrine system regulates processes such as growth, reproduction, and nutrient use.
- ▶ The lymphatic system picks up fluid 'leaked' from the blood vessels and returns it to the blood.
- ▶ The immune system attacks foreign substances within the body.
- ▶ The digestive system disposes of items which have been eaten, but which lack nutrient value.
- ▶ The urinary system eliminates excess nitrogen from the body.
- ▶ The integumentary system is the primary site of pressure and pain receptors, as well as sweat and oil glands.
- ▶ The skeletal system provides a framework and leverage so that muscles can cause movement.
- ▶ The muscular system allows us to move objects in the environment, as well as to move our own bodies.
- ▶ The nervous system is the fastest-acting control system of the body, activating muscles and glands as



needed.

- ▶ The cardiovascular system transports oxygen, carbon dioxide, nutrients, and wastes throughout the body, in the blood.
- ▶ The respiratory system keeps blood supplied with oxygen and disposes of unwanted carbon dioxide.
- ▶ The digestive system breaks food down into chemicals which can enter the blood for distribution to the body's cells.
- ▶ The urinary system regulates water and electrolyte levels and (to some extent) the pH of the blood.
- ▶ The reproductive system produces sperm or eggs and sex hormones.
- ▶ The mammary glands (breasts) are a part of the reproductive system.
- ▶ To live, an organism must separate the internal and external environments.
- ▶ To live, an organism must be able to sense and respond to changes in the environment.
- ▶ Metabolism refers to the entire set of chemical reactions which occur within an organism.
- ▶ Life forms must dispose of unneeded items, which is done in a process called excretion
- ▶ Living organisms must be able to move items; often themselves, but at the least, molecules and subdivisions within themselves.
- ▶ Organisms that ingest other organisms must digest these items to capture energy and raw materials.
- ▶ Anabolism refers to chemical reactions which lead to the production of complex molecules or structures within an organism.
- ▶ Catabolism refers to chemical reactions which degrade or destroy complex molecules or structures within an organism in order to capture energy or raw materials.
- ▶ Since no organism is immortal, any life form existing now must have had ancestors which were capable of reproduction
- ▶ To avoid a reduction in size from one generation to the next, living organisms must be able to grow
- ▶ In order to survive, humans (and human cells) require nutrients for raw materials and energy, oxygen to allow aerobic respiration (one of the major metabolic reactions), and water to dissolve all of the chemicals of life so that reactions can occur.
- ▶ When a constant, dynamic equilibrium is maintained despite changes in the environment (for example, our ability to maintain a constant body temperature), this is called homeostasis
- ▶ To maintain homeostasis, a receptor must monitor the internal or external environment to detect changes.
- ▶ To maintain homeostasis, a control center must respond to signals indicating that a change has occurred by triggering events which will influence the change.
- ▶ To maintain homeostasis, an effector must be capable of altering the condition that is being maintained.
- ▶ The three components of a system which maintains homeostasis are a receptor; a control center and an effector
- ▶ All tissues in the body are classified as epithelia; connective; muscle or nervous
- ▶ The defining characteristic of epithelial tissue is that it forms surface
- ▶ Epithelial tissues always form a surface.
- ▶ With few exceptions, there is little cell: cell contact in connective tissue.
- ▶ Nervous tissue is characterized by the ability to conduct electrical signals
- ▶ To conduct a signal to another location each nerve cell extends one or more



- ▶ long processes toward another cell.
- ▶ Muscle tissue is characterized by the ability to shorten
- ▶ Squamous cells are squashed, like a fried egg.
- ▶ When flat, surface epithelial cells are alive, they are non-keratinized
- ▶ Cuboidal cells are round or square.
- ▶ Columnar cells are moderately long and slender.
- ▶ The schemes use to classify the many tissue sub-types have not been standardized and vary from textbook to textbook.
- ▶ Connective tissue is characterized by the presence of a non living matrix in which the cells are found.
- ▶ Nerve cells require "helper" cells, and are usually surrounded by them. Helper cells (called glia) are much smaller than the nerve cells.
- ▶ Muscle cells generally make tight contact with other cells and do not form a surface, nor do they extend processes toward other cells.
- ▶ The two major attributes that are used in classifying epithelial tissue are the number of layers and cell shape
- ▶ Epithelia whose cells are arranged into a single layer of cells is classified as simple whereas multiple layer epithelia are classified as stratified
- ▶ When flat, surface epithelial cells are dead, lack nuclei, and are filled with a tough, cross linked protein, they are keratinized
- ▶ An matrix is nonliving material in which something is embedded.
- ▶ Apical means 'at the top.'
- ▶ A non-cellular, adhesive supporting layer made up of glycoproteins secreted by epithelial cells is called a basal lamina
- ▶ The two layers that form the basement membrane, from superficial to deep, are the basal and reticular laminae
- ▶ Avascular means, 'containing no blood vessels
- ▶ Innervated means, 'supplied by nerve fibers
- ▶ Epithelial tissue is highly cellular, that is, contains very little extracellular matrix.
- ▶ The apical cells of stratified squamous epithelia are alive if the tissue is moist or wet, etc.)
- ▶ An gland is one or more cells that makes and secretes an aqueous fluid.
- ▶ Endocrine glands produce hormones
- ▶ Mucous, sweat, oil, and salivary glands are all exocrine glands.
- ▶ An exocrine gland whose duct does not branch is simple
- ▶ An exocrine gland whose duct branches is compound
- ▶ An exocrine gland whose secretory units are round is alveolar (or acinar)
- ▶ An exocrine gland whose secretory units are elongated is tubular
- ▶ Cells in connective tissue are surrounded by a complex extracellular matrix.
- ▶ Stratified cuboidal epithelia is a tissue which consists of two layers of round or square cells which separate an open space from a basal or reticular lamina. While most tissue types are found throughout the body, this one is rare and is only seen in sweat and mammary glands.
- ▶ Stratified columnar epithelia is a tissue which consists of two layers of tall cells which separate an open space from a basal or reticular lamina.
- ▶ Transitional epithelia is a tissue which is easily stretched. It consists of several layers of cells which separate an open space from a basal or reticular lamina, and the surface cells are usually dome shaped if the tissue is not stretched at



the time of fixation.

- ▶ Endocrine glands are ductless, that is, their products are released directly from the cells into the bloodstream.
- ▶ Exocrine glands have a duct through which their products are secreted onto the body's surface or into body cavities.
- ▶ Most glands are multicellular. The only important one that is not is the goblet cell, which produces mucus.
- ▶ Merocrine exocrine glands secrete substances: that is, the substance is exocytosed into the duct.
- ▶ Holocrine exocrine glands become filled with their product, then rupture, spilling their contents into the duct.
- ▶ Apocrine exocrine glands accumulate their product in the apex of the cell, which then detaches.
- ▶ Mesenchyme is the embryonic tissue type that gives rise to all connective tissue in the adult body.
- ▶ Collagen is a tough, extremely strong fibrous protein which gives connective tissue strength.
- ▶ The major matrix producing cells in connective tissue proper are called fibroblasts
- ▶ The major matrix producing cells in cartilage are called chondroblasts
- ▶ The major matrix producing cells in bone are called osteoblasts
- ▶ There are four major classes of connective tissue
- ▶ The unstructured portion of the matrix that fills the space between cells in connective tissue is called the ground substance
- ▶ The epidermis is composed of squamous epithelial tissue
- ▶ The dermis is composed of areolar connective tissue and dense irregular connective tissue
- ▶ The hypodermis is composed of areolar connective tissue and adipose

connective tissue

- ▶ Most of the melanin in skin is in keratinocytes
- ▶ The deepest layer of the epidermis is the stratum basale
- ▶ Skeletal cartilage is avascular.
- ▶ Nutrients for cells within skeletal cartilage are not delivered directly to the cells by the blood, but must instead diffuse from a remote region.
- ▶ Articular cartilage covers ends of long bones.
- ▶ Costal cartilage connects the ribs to the sternum.
- ▶ Ribs 1 to 7 are the true ribs.
- ▶ The largest and strongest bone in the body is the Femur
- ▶ Which bones are found in the anatomical leg? Tibia & fibula
- ▶ One detrimental change in old age is that bones lose mass
- ▶ A articulation or joint, is any site where two bones meet.
- ▶ Joints are classified by two criteria: structure and function
- ▶ The three structural classifications for joints are fibrous; cartilaginous and synovial
- ▶ A joint that is immobile is a synarthrotic joint.
- ▶ A joint that allows only a small amount of movement is an amphiarthrotic joint.
- ▶ A freely movable joint is a diarthrotic joint.
- ▶ The most fatigue-resistant muscle cells are those of cardiac muscle.
- ▶ Muscle cells are also called muscle fibers
- ▶ Cardiac muscle fibers contain large numbers of mitochondria, which allow them to have incredible endurance.
- ▶ Smooth muscle is found in hollow organs whose contents must be moved.



- ▶ Blood pressure is controlled by smooth muscle.
- ▶ Much of the heat in the body is produced by skeletal (or voluntary) muscle.
- ▶ The three primary brain vesicles are formed during the 4th week after conception.
- ▶ The neural tube, initially hollow, remains filled with liquid in the adult. TRUE
- ▶ White matter is composed of myelinated neuronal axons
- ▶ Gray matter is found in the central region of all major CNS areas.
- ▶ Gray matter is found in the cortex of the cerebrum and cerebellum
- ▶ White matter surrounds the central core of gray matter in the CNS.
- ▶ Ventricles are fluid-filled chambers within the brain.
- ▶ Cerebrospinal fluid is the fluid which surrounds, and fills the hollow areas in, the CNS.
- ▶ The two hemispheres of the brain are separated by a deep cleft called the longitudinal fissure
- ▶ The cerebrum and cerebellum are separated by the transverse fissure
- ▶ Motor areas of the cerebral cortex control voluntary movement.
- ▶ The association areas of the cerebral cortex allow us to integrate and consider information.
- ▶ The visual cortex is responsible for sight, and is located in the occipital lobe
- ▶ The gustatory cortex, responsible for taste, is in the parietal lobes.
- ▶ The vestibular cortex allows us to maintain balance and is located in the insula
- ▶ The auditory cortex allows us to perceive sound, and is located in the temporal lobes.
- ▶ The auditory association area stores memories of sounds and allows identification of sounds.
- ▶ The left hemisphere usually controls math and logic.
- ▶ The right hemisphere usually controls visual and spatial skills, emotion, and artistic skills.
- ▶ Cerebral dominance refers to the hemisphere of the cerebrum that is dominant for language
- ▶ Association fibers are axons which connect different parts of a single brain hemisphere.
- ▶ Masses of gray matter found deep within the cerebral white matter are called basal nuclei
- ▶ The correct timing and velocity of movements is controlled by the basal nuclei
- ▶ The diencephalon is the central core of the forebrain.
- ▶ The thalamus, hypothalamus, and epithalamus constitute the diencephalon
- ▶ Emotional responses to events are in part mediated by the hypothalamus
- ▶ Body temperature is mediated by the hypothalamus
- ▶ Appetite is mediated by the hypothalamus
- ▶ Sleep and the sleep cycle are regulated by the hypothalamus
- ▶ The pineal gland, habenula, and choroid plexus of the third ventricle constitute the epithalamus
- ▶ The brain stem connects the brain to the spinal cord.
- ▶ Ten of the twelve pairs of cranial nerves originate in the brain stem
- ▶ The midbrain is a subdivision of the brain stem
- ▶ Blood pressure, rate and force of heartbeat, digestive tract motility, the



- rate and depth of breathing, and many other autonomic functions are controlled in the hypothalamus
- ▶ Fibers of the pons relay impulses between the motor cortex and the cerebellum.
  - ▶ The pons is a subdivision of the brain stem
  - ▶ The lowest portion of the brain stem is the medulla oblongata
  - ▶ Coughing, sneezing, swallowing, and vomiting are controlled by nuclei found in the medulla oblongata
  - ▶ The gyri of the cerebellum are called folia
  - ▶ The vermis is the central region of the cerebellum.
  - ▶ The fear response, suppression of pain, and the motor nuclei for two of the cranial nerves which control eye movement, are found in the periaqueductal gray matter of the midbrain
  - ▶ The cerebral peduncles found on the ventral face of the midbrain, house the pyramidal fiber tracts and convey signals from the cerebral cortex to the spinal cord and PNS.
  - ▶ Respiration is in part regulated by nuclei of the pons, the fibers of which are part of the brain stem.
  - ▶ Coughing, sneezing, swallowing, and vomiting are controlled by nuclei found in the medulla oblongata
  - ▶ The motor tracts of the spinal cord are located in the lateral and anterior funiculi
  - ▶ Long term paralysis results in irreversible deterioration of the muscle
  - ▶ Reflex tests are used to verify that the spinal cord and brain are functioning properly.
  - ▶ Hypertension (high blood pressure) results if the sympathetic vasoconstrictor response is overactive.
  - ▶ In MRI, radio waves are used to produce detailed images which include soft tissues.
  - ▶ Mechanoreceptors respond to pressure, itch, touch, vibration, and stretch.
  - ▶ Thermoreceptors are sensitive to changes in temperature.
  - ▶ Photoreceptors respond to light energy; in humans, these are found in the retina.
  - ▶ Nociceptors are receptors that are dedicated to sensing pain.
  - ▶ Merkel disks respond to light pressure
  - ▶ Hair follicle receptors are responsible for detecting light touch (hair deflection)
  - ▶ Meissner's corpuscles are responsible for detecting light pressure, texture
  - ▶ Pacinian corpuscles are responsible for detecting deep pressure
  - ▶ Ruffini's corpuscles are responsible for detecting deep pressure or stretch
  - ▶ Muscle spindles are responsible for detecting muscle stretch
  - ▶ Golgi tendon organs are responsible for detecting tendon stretch
  - ▶ Rootlets are small bundles of axons emerging from or entering the spinal cord.
  - ▶ As the distance from the spinal cord increases, rootlets merge to form roots
  - ▶ The dorsal roots are formed from the axons of neurons whose cell bodies are in the dorsal root ganglia
  - ▶ Dorsal roots contain sensory (or afferent) fibers.
  - ▶ Spinal nerves leave the spinal column through intervertebral foramen
  - ▶ The ventral and dorsal roots merge to form the spinal nerves as they exit the vertebral column.
  - ▶ A cataract refers to clouding of the lens
  - ▶ Color blindness is due to the genetic absence of one type of cone



- ▶ Color blindness is due to a defect on the X chromosome.
- ▶ The left hemisphere of the brain receives information from the right half of the visual field
- ▶ The inner ear is also called the labyrinth
- ▶ Steroids, one of the two major hormone classes, are made from cholesterol
- ▶ The receptors for steroids and thyroid hormone are intracellular
- ▶ Most cells in the body are target cells for thyroid hormone.
- ▶ Follicle cells surround compartments (follicles) in which iodinated thyroglobulin is stored
- ▶ PTH increases calcium in the blood.
- ▶ Cells in muscle and fat cannot remove sugar from the blood unless insulin is present.
- ▶ Pancreatic cells produce insulin primarily in response to humoral signals.
- ▶ The major targets of insulin are muscle, fat and liver
- ▶ The autonomic nervous system is a subdivision of the motor division of the PNS
- ▶ In the somatic nervous system, the effectors are voluntary
- ▶ In the autonomic nervous system, the effectors are involuntary muscles and glands
- ▶ Thermoregulation is controlled by the sympathetic division of the ANS.
- ▶ Metabolic rate is controlled by the sympathetic division of the ANS.
- ▶ Parasympathetic nerve fibers leave the CNS only in the cervical and sacral region(s).
- ▶ Heart rate is increased by the sympathetic division of the ANS.
- ▶ Heart rate is decreased by the parasympathetic division of the ANS.
- ▶ The bronchioles in the lungs are constricted by the parasympathetic division of the ANS.
- ▶ The bronchioles in the lungs are dilated by the sympathetic division of the ANS.
- ▶ During development, pre-ganglionic neurons of the ANS are derived from the embryonic neural tube
- ▶ Gustation, or taste, is the sensation and perception of chemicals dissolved in saliva.
- ▶ Chemoreceptor proteins change shape when they bind to the chemical they are built to recognize.
- ▶ Olfactory cells are bipolar neurons
- ▶ Astigmatism is a problem in which the cornea is unevenly shaped, so that objects appear wavy.
- ▶ Antidiuretic hormone (ADH) promotes water retention by the kidneys
- ▶ The release of ADH is controlled by osmoreceptors in the hypothalamus
- ▶ T4 is also known as thyroxine
- ▶ The numbers in 'T3' and 'T4' refer to the number of iodine atoms bound to each molecule.
- ▶ An EEG or electroencephalogram is a recording of the brain's electrical activity.
- ▶ Delta waves occur during deep sleep
- ▶ During REM sleep, skeletal muscle movement is inhibited and most dreams occur.
- ▶ During REM sleep, the brain wave patterns mimic wakefulness.
- ▶ Damage to the limbic system will prevent the acquisition of new declarative memories.
- ▶ Procedural memory is mediated by the corpus striatum, one of the basal nuclei.
- ▶ The meninges are a set of three connective tissue membranes that surround the CNS.
- ▶ The tough, fibrous, double-layered,



- ▶ outermost meninx is the dura mater
- ▶ The arachnoid mater is the middle meninx.
- ▶ The main blood vessels supplying the brain are in the sub-arachnoid space.
- ▶ The cells of the capillaries in the brain are unusual in that they are joined by tight junctions
- ▶ Capillaries in the brain are much less permeable than capillaries elsewhere in the body.
- ▶ A plexus is a complex network of interacting and cross connected nerves.
- ▶ Each nerve leaving a plexus is a combination of axons from several spinal nerves
- ▶ Plexuses consist of axons from the ventral rami of spinal nerves.
- ▶ Science developed under the Islamic civilization between the 8th and 15th centuries is known as the Islamic Golden Age and also known as period of Islamic Scientists
- ▶ With the fall of Muslim Spain in 1492, scientific and technological initiative generally passed to Christian Europe and led to what we now call the Renaissance.
- ▶ Ibn al-Haytham (Alhazen) is regarded as the "father of optics"
- ▶ Ibn al-Haytham (Alhazen) was also the first to discover Fermat's principle of least time, Newton's first law of motion, and a general formula for integral calculus using an early inductive proof.
- ▶ Ibn al-Haytham (Alhazen) also laid the foundations for telescopic astronomy, and he was the first Muslim astronomer to support a heliocentric model.
- ▶ Ibn al-Haytham (Alhazen) was the pioneer of the modern scientific method.
- ▶ Ibn al-Haytham (Alhazen) used the scientific method to obtain the results in his book Optics
- ▶ The Alhazen crater on the Moon was named in his honour.
- ▶ The Latin translation of his main work, Kitab al-Manazir, exerted a great influence upon Western science e.g. on the work of Roger Bacon who cites him by name and Kepler.
- ▶ In his book Mizan al-Hikmah, Ibn al-Haytham has discussed the density of the atmosphere and related it to altitude.
- ▶ Ibn al-Haytham discovered that the twilight only ceases or begins when the Sun is  $19^\circ$  below the horizon and attempted to measure the height of the atmosphere on that basis.
- ▶ Alhacen was a pioneer in optics, engineering and astronomy.
- ▶ Two rockets of Tipu, captured by the British at Srirangapatana, are displayed in the Woolwich Royal Artillery Museum in London.
- ▶ Ibn al-Haytham held light rays to be streams of minute particles that travelled at a finite speed.
- ▶ Ibn al-Haytham improved Ptolemy's theory of the refraction of light, and discovered the laws of refraction.
- ▶ Nasir al-Din Tusi resolved significant problems in the Ptolemaic system with the Tusi-couple, which played an important role in Copernican heliocentrism.
- ▶ In early Arabic sources, ilm al-nujum was used to refer to both astronomy and astrology.
- ▶ In medieval sources, however, a clear distinction was made between ilm al-nujum (science of the stars) or ilm al-falak (science of the celestial orbs), referring to astrology
- ▶ The optical writings of Ibn al-Haytham are reported to have laid the foundations for the later European development of telescopic astronomy.
- ▶ Al-Kindi's (Alkindus) law of terrestrial gravity influenced Robert Hooke's law



- of celestial gravity, which in turn inspired Newton's law of universal gravitation.
- ▶ Al-Zarqali (Arzachel) also stated that the planets moved in ellipses with the Sun at one focus, which is now known as Kepler's first law of planetary motion.
- ▶ Muslim chemists included Al-Razi, Abu al-Rayhan al-Biruni and Al-Kindi.
- ▶ Abu al-Rayhan al-Biruni is regarded as the "father of geodesy", "the first anthropologist" and one of the first geologists.
- ▶ Abu al-Rayhan al-Biruni made a number of contributions to the Earth sciences.
- ▶ In particular, he is regarded as the "father of geodesy" for his important contributions to the field of geodesy, along with his significant contributions to geography and geology.
- ▶ In the 12th century, Sharaf al-Din al-Tusi found algebraic and numerical solutions to cubic equations and was the first to discover the derivative of cubic polynomials, an important result in differential calculus.
- ▶ Abu al-Qasim al-Zahrawi (Abulcasis) was regarded as the "father of modern surgery",
- ▶ Abu al-Qasim al-Zahrawi (Abulcasis) contributed greatly to the discipline of medical surgery with his Kitab al-Tasrif ("Book of Concessions"), a medical encyclopedia
- ▶ In the 15th century, the Persian work by Mansur ibn Muhammad ibn al-Faqih Ilyas entitled Tashrih al-badan ("Anatomy of the body") contained comprehensive diagrams of the body's structural, nervous and circulatory systems.
- ▶ The Arab physician Ibn al-Nafis, proposed the theory of pulmonary circulation. Other medical advancements came in the fields of pharmacology and pharmacy.
- ▶ Medical inventions in the Muslim world included oral anesthesia, inhalant anesthesia, distilled alcohol, medical drugs, chemotherapeutical drugs, injection syringe, and a number of antiseptics and other medical treatments.
- ▶ A page of Ibn Sahl's manuscript showing his discovery of the law of refraction (Snell's law)
- ▶ Ibn Sahl, a mathematician connected with the court of Baghdad, wrote a treatise On Burning Mirrors and Lenses in 984 in which he set out his understanding of how curved mirrors and lenses bend and focus light.
- ▶ Ibn Sahl is now credited with first discovering the law of refraction, usually called Snell's law.
- ▶ Ibn Khaldun, regarded as the father of demography, historiography, philosophy of history, and sociology.
- ▶ Abu al-Rayhan al-Biruni (973-1048) has been described as "the first anthropologist".
- ▶ Ibn Khaldun (1332-1406) is regarded as the father of demography, historiography, philosophy of history, and sociology, and is viewed as one of the forerunners of modern economics.
- ▶ Ibn Khaldun is best known for his Muqaddimah "Prolegomenon".
- ▶ Kharazmi (Latinized name Algorithm). Developed the "calculus of resolution and juxtaposition" (hisab al-jabr w'al-muqabala), more briefly referred to as al-jabr, or algebra
- ▶ Abu'l-Wafa al-Buzjani was a famous Muslim mathematics
- ▶ al-Karaji (full name, Abu Bekr ibn Muhammad ibn al-Husayn Al-Karaji or al-Karkhi) was believed to be the "first person to completely free algebra from geometrical operations and to replace them with the arithmetical type of operations which are at the core of algebra today
- ▶ Abul Hasan Ali Al-Masudi, best known as a cartographer, was also a traveler



- historian, etc. Al-mas'oudi described his visit to the oilfields of Baku. Wrote on the reaction of alkali water with zaj (vitriol) water giving sulfuric acid
- ▶ Ibn Zuhri (Avenzoar) was associated with Surgery and Medicine
  - ▶ Famous works of Muhammad Al-Idrisi (Dreses) are a world Map and the first known globe.
  - ▶ Muhammad al-Idrisi, aka Idris al-Saqalli aka al-sharif al-idrisi of Andalusia and Sicily. Said to draw the first correct map of the world "lawh al-tarsim" (plank of draught).
  - ▶ Abdubacer Ibn Tufayl of Spain's most famous work is Hayy ibn Yaqzan, which is a spiritual investigation into the reality of the world narrated by a man who was raised from infancy by a roe or gazelle.
  - ▶ Ibn Rushd (Averroes) Philosophy, Law, Medicine, Astronomy, Theology.
  - ▶ al-Samawal. An important member of al-Karaji's school of algebra. Gave this definition of algebra: "[it is concerned] with operating on unknowns using all the arithmetical tools, in the same way as the arithmetician operates on the known."
  - ▶ Ibn Al-Nafis b. ca. 607AH, d. ca. 689AH. Damascene physician and anatomist.
  - ▶ Al-Jawbari describes the preparation of rose water in the work "Book of Selected Disclosure of Secrets" (Kitab kashf al-Asrar).
  - ▶ An Arabic manuscript written in syriac script gives description of various chemical materials and their properties such as sulfuric acid, sal-ammoniac, saltpetre and zaj (vitriol).
  - ▶ Nasir Al-Din Al-Tusi was associated with Astronomy and Non-Euclidean geometry
  - ▶ Ibn Al-Baitar. Studied and wrote on botany, pharmacy and is best known for studying animal anatomy and medicine. The Arabic term for veterinary medicine is named after him.
  - ▶ al-Farisi. Gave a new proof of Thabit ibn Qurra's theorem, introducing important new ideas concerning factorization and combinatorial methods
  - ▶ al-Farisi also gave the pair of amicable numbers 17296, 18416 which have also been joint attributed to Fermat as well as Thabit ibn Qurra
  - ▶ Al-Kashani promotes a center for ceramics. He also writes a book on Islamic ceramics techniques. His name is still associated with ceramics in the Muslim Orient today.
  - ▶ Abu Abdullah Muhammad ibn Battuta; World Traveler. 75,000 mile voyage from Morocco to China and back
  - ▶ Ulugh Beg (1393 - 1449) commissions an observatory at Samarkand in present-day Uzbekistan.
  - ▶ Ibn Masoud was the first to use the decimal point in arithmetic.
  - ▶ First to introduce the zero (Indian mathematicians had used only nine glyphs for numerals).
  - ▶ Al-Kashi writes Compendium of the Science of Astronomy
  - ▶ Al-Kashi writes Treatise on the Circumference giving a remarkably good approximation to pi in both sexagesimal and decimal forms
  - ▶ Tipu, Sultan of Mysore in the south of India, was an experimenter with war rockets.
  - ▶ Lotfi Zadeh of Iran develops fuzzy logic.
  - ▶ Al-Razi was one of the most important physicians of medieval times.
  - ▶ The Persian physician al-Razi, also known as Rhazes, prepared compilations that were influential in Western medicine for centuries. His monograph on smallpox and measles is still considered a medical classic.
  - ▶ Abu Bakr Muhammad ibn Zakariya al-Razi was born at Ray, a city not far from modern Teheran in northeastern Iran.



- ▶ Abu Bakr Muhammad ibn Zakariya al-Razi's appointment occurred as post of chief physician during the caliphate of al-Muktafi, who reigned at Baghdad from 902 to 907.
- ▶ Al-Razi's most important medical work, the Kitab al-Hawi, is a compilation of the notes on his thoughts, reading, and practice that he amassed throughout his entire medical life.
- ▶ Rhazes was chief physician at the Baghdad hospital.
- ▶ 1 barrel is equal to 159 liters
- ▶ 6 feet is equal to 1 fathom
- ▶ Red to orange pigments are Carotenes
- ▶ NADH is oxidized by Coenzyme
- ▶ Initial pH of food vacuole during digestion in amoeba is 5.6
- ▶ Salivary glands present in front of ear are Parotid
- ▶ If bile pigments are prevented from leaving digestive tract, then they cause? Jaundice
- ▶ How many spiracles are present in cockroach? 20
- ▶ Gaseous exchange in birds occurs at level of Parabronchi
- ▶ An infectious disorder of respiratory system is Tuberculosis
- ▶ According to cohesion-tension theory, tension is created by Transpiration
- ▶ Cuticular transpiration is \_\_\_\_\_ of total transpiration? 5-7%
- ▶ \_\_\_\_\_ cells of phloem are directly involved in transport of organic solutes? Sieve element
- ▶ Deoxygenated blood first enters in \_\_\_\_\_ part in fishes? Sinus venosus
- ▶ 95% of the cytoplasm of RBCs is Hemoglobin
- ▶ "lubb" sound is produced due to Closure of inlet valve
- ▶ An antibody is made of \_\_\_\_\_
- ▶ polypeptide chains? 4
- ▶ \_\_\_\_\_ of earth surface is covered with water? 75%
- ▶ Ozone depletion occurs commonly due to Chlorofluorocarbons
- ▶ The productivity of aquatic ecosystem is basically determined by light and Nutrients
- ▶ Ecosystem not found in Pakistan is Tropical rain forest
- ▶ Annual rainfall in grassland is about 250-750 mm
- ▶ Which is the most constant abiotic component of ecosystem? Gravity
- ▶ Conversion of ammonia or ammonium ion into nitrites during nitrogen cycle occurs due to Nitrosomonas
- ▶ \_\_\_\_\_ supported theory of special creation? Linnaeus
- ▶ In Hardy-Weinberg formula P<sup>2</sup> represents frequency of Homozygous dominant individual
- ▶ Humming bird is an example of Heterotherm
- ▶ In condition of high temperature, following does not occur or occurs at low level? Thermogenesis
- ▶ Sapwood is formed from Secondary xylem
- ▶ Number of cervical vertebrae is 7
- ▶ Joints present in skull are example of Fibrous joints
- ▶ Only myosine is present in H zone
- ▶ Parkinson's disease is a nervous disorder characterized by involuntary tremors, diminished motor power and rigidity.
- ▶ Which hormone is polypeptide in nature? ADH
- ▶ Secretin inhibits production of Gastric juice
- ▶ Highest form of learning is Insight learning



- ▶ Far-red light promotes flowering in Short day plant
- ▶ In human female, fertilization commonly occurs at Proximal part of oviduct
- ▶ Yellowish glandular structure which produces progesterone is Corpus luteum
- ▶ Yellow cytoplasm in ascidian gives rise to Muscle cells
- ▶ Embryonic induction is caused by part developing from Mesoderm
- ▶ Purines and pyrimidines are in equal ratio in DNA. It was indicated by Chargaff
- ▶ Okazaki fragments are connected together through action of Ligase
- ▶ Sickle cell anemia is an example of Point mutation
- ▶ Which of the following is an autosomal disorder Down's syndrome
- ▶ Test cross is used to find Genotype
- ▶ An example of codominance is AB<sup>+</sup> blood group
- ▶ XO-XX pattern of sex determination is present in Grasshopper
- ▶ The process that has transformed life on earth from its earliest forms to vast diversity is Evolution
- ▶ Carolus Linnaeus was believer of Special creation
- ▶ Archaeobacteria can survive at 120°C
- ▶ What was the source of hydrogen for first photosynthetic organisms? Hydrogen sulphide
- ▶ Prokaryotes are considered to be evolved 3.5 billion years ago
- ▶ Flagella might have arisen through the ingestion of Spirochetes
- ▶ Important point/s of Lamarck's theory A. Use and disuse of organs B. Inheritance of acquired characters
- ▶ Who developed a theory of natural selection essentially identical to

## Darwin's? Alfred Wallace

- ▶ Neo-Darwinism has integrated discoveries and ideas from? Taxonomy, Paleontology & Genetics
- ▶ The actual remains or traces of organisms that lived in ancient geological times? Fossils
- ▶ Most fossils are found in the Sedimentary rocks
- ▶ Homologous organs are functionally different but structurally alike
- ▶ Examples of homologous structures are arms of man, forelimb of cat, flipper of whale
- ▶ Examples of analogous structures are wings of bats, birds and insects
- ▶ Analogous organs show Convergent evolution
- ▶ In humans gill pouches have modified into Eustachian tubes
- ▶ A group of interbreeding individuals belonging to a particular species and sharing a common geographic area is called Population
- ▶ Natural selection can amplify or diminish variations that are Heritable
- ▶ Adaptations that an organism acquires by its own actions are Not heritable
- ▶ A group of populations that have the potential to interbreed in nature is Species
- ▶ The total aggregate of genes in a population at any one time is called population's Gene pool
- ▶ If all members of a population are homozygous for the same allele, that allele is said to be Fixed in gene pool
- ▶ According to Hardy-Weinberg theorem, frequencies of alleles and genotypes in a population's gene pool remain Constant unless acted upon by agents other than sexual recombination
- ▶ The ultimate source of all changes is Mutation



- ▶ Disturbance in the gene pool is created by? Emigration & Immigration
- ▶ Change in the frequency of alleles at a locus that occurs by chance is Genetic drift
- ▶ Which of the following organs serve as apparent purpose? Non vestigial organs, Homologous organs & Analogous organs
- ▶ Which processes had resulted in the production of different breeds of domestic dogs and pigeons? Artificial selection
- ▶ Concept of evolution was first presented by Aristotle
- ▶ Study of relationship of organisms to their environment is Ecology
- ▶ An early stage of embryonic development consisting of a hollow ball of cells. The product of cleavage is called Blastocyst.
- ▶ A small disc of cells at the animal end of a reptile or bird embryo that results from early cleavages is called Blastoderm.
- ▶ Any of the cells produced by cleavage of a zygote is called Blastomeres.
- ▶ The point of invagination at which cells on the surface of the blastula move to the interior of the embryo during gastrulation is called Blastopore.
- ▶ An early stage in the development of an embryo. It consists of a sphere of cells enclosing a fluid-filled cavity (blastocoel) is called Blastula.
- ▶ Process involving bone formation and estruction in response to hormonal and mechanical function is called Bone remodeling.
- ▶ Repaired tissue (fibrous or bony) formed at fracture site is called Callus.
- ▶ An individual who carries malfunctioning gene in heterozygous condition is called Carrier.
- ▶ The flexible connective tissue is called Cartilage.
- ▶ Condensed region of a eukaryotic chromosome where sisterchromatids are attached to each other after replication is called Centromere.
- ▶ A clear fluid, produced within the ventricles of the brain, that fills the ventricles and cushions the brain and spinal cord is called Cerebrospinal fluid.
- ▶ A sensory receptor that responds to chemicals from within the environment; used in the chemical senses of taste and smell is called Chemoreceptor.
- ▶ Nitrogen containing heterosaccharide molecule is called Chitin.
- ▶ One of the two daughter strands of a duplicated chromosome that is joined by a single centromere is called Chromatid.
- ▶ The complex of DNA and proteins of which eukaryotic chromosomes are composed. Chromatin is highly uncoiled and diffused in interphase nuclei, condensing to form the visible chromosomes in prophase is called Chromatin.
- ▶ The vehicle by which hereditary information is physically transmitted from one generation to the next. In a bacterium the chromosome consists of a single naked circle of DNA. In eukaryotes each chromosome consists of a single linear DNA molecule and the associated proteins is called Chromosome.
- ▶ An event that recurs with a period of about 24 hours, even in the absence of environmental cues is called Circadian rhythm.
- ▶ Producing a cell line or culture all of whose members contain identical copies of a particular nucleotide sequence; an essential element in genetic engineering is called Cloning.
- ▶ The basic unit of genetic code. A sequence of three adjacent nucleotides in DNA or RNA that code for one amino acid is called Codon.
- ▶ A specialized type of parenchyma



- usually located just beneath the epidermis, function as supporting tissue is called Collenchyma.
- ▶ An exchange of segments between non-sister chromatids of homologous chromosomes during meiosis is called Crossing over.
  - ▶ A group of substances chemically related to fatty acids forming continuous layer is called Cutin.
  - ▶ An autosomal disorder that produces the most common fatal genetic disease in Caucasians, characterized by secretion of thick mucus that clogs passages in the lungs, liver and pancreases is called Cystic fibrosis.
  - ▶ A plant hormone that promotes cell division, fruit growth, and the sprouting of lateral buds and prevents the aging of plant parts, especially leaves is called Cytokinin.
  - ▶ A branched tendril that extends outward from the cell body of a neuron; specialized to respond to signals from the external environment or from other neurons is called Dendrite.
  - ▶ All populations within an ecosystem interconnected to one another are known as Community
  - ▶ Major regional ecological community of plants and animals forms Biomes
  - ▶ The actual location or place where an organism lives is Habitat
  - ▶ The role a species plays in a community including behavior and influence is Niche
  - ▶ Study of a single population's relationship to its environment is called Autecology
  - ▶ The biosphere covers about 16-20 km
  - ▶ Abiotic components include atmosphere & hydrosphere & lithosphere
  - ▶ Fungi and bacteria are decomposers
  - ▶ Sequence of changes in community and its non-living environment over a period of time is Succession
  - ▶ Plants growing in xeric conditions are called Xerophytes
  - ▶ Lichen and algae form Pioneers community
  - ▶ Diverse and stable community at the end of succession is Climax community
  - ▶ Secondary succession starts from remains of previous ecosystem
  - ▶ Hydrosere is primary succession starting in a pond
  - ▶ Mosses are Tortula
  - ▶ Wood forests form the climax community
  - ▶ Disease in living organisms caused by parasites is called Infestation
  - ▶ When ants bite, they inject formic acid
  - ▶ Legume plants are the hosts to Rhizobium
  - ▶ Rhizobia are soil bacteria that fix nitrogen (diazotrophs) after becoming established inside root nodules of legumes (Fabaceae).
  - ▶ In order to express genes for nitrogen fixation, rhizobia require a plant host; they cannot independently fix nitrogen.
  - ▶ A dual organism composed of symbiotic association of an alga living within a fungus mycelium is Lichen
  - ▶ Symbiosis relationship in which only one organism is benefited is Commensalism
  - ▶ Sharks may have small fish attached to them called Remoras
  - ▶ Over grazing leads to Totally barren lands
  - ▶ Nitrogen constitutes about \_\_\_\_\_ % of atmosphere? 78%
  - ▶ Oxidation of ammonia or ammonium ions by bacteria in soil is called Nitrification
  - ▶ Gross primary production is total amount of energy fixed by all plants



- ▶ Plant biomass is net primary production & gross primary production minus respiratory loss
- ▶ Total solar energy trapped by the producers in an ecosystem is 1%
- ▶ The major unit of ecology is Ecosystem
- ▶ Eco' part of word ecosystem means Environment
- ▶ Food web formed from food chain
- ▶ Food web is complex than food chain
- ▶ Food web is more stable than food chain
- ▶ Grasses are more tolerant to herbivore
- ▶ Which of the following step of nitrogen cycle is useful for plants? Ammonification & Nitrification
- ▶ Weather refers to short-term fluctuations in temperature, cloud cover, wind and precipitation
- ▶ Weather prevails over periods of hrs or days
- ▶ Salt water of ocean and sea are the largest ecosystems on earth
- ▶ Fresh water ecosystem covers less than 1% of earth surface
- ▶ In hydrospheric ecosystem temperature is more moderate to support life
- ▶ Productivity of an ecosystem is indicated by Number of plants in that ecosystem & the density of that ecosystem
- ▶ In which zone plant community is most diverse? Littoral zone
- ▶ Decomposers and detritus feeders inhabit it
- ▶ Eutrophication is adequate nutrition accelerated by human activities
- ▶ In polluted lake which organisms dominate the community? Blue green algae
- ▶ Evolution of vascular bundles in plants and skeleton in animals is an adaptation for terrestrial ecosystem
- ▶ Development of bark in plants and skin in animals is a method for reducing water loss
- ▶ Average rainfall in temperate deciduous forests is 750-1500mm
- ▶ Temperature of coniferous alpine and boreal forests is upto 10 degrees
- ▶ Northern coniferous forests are called Taiga
- ▶ Temperature of temperate deciduous forests is 4-30 degree C
- ▶ Coniferous forests located at high altitude are called Alpine
- ▶ Grass land in tropic climates with woody trees is called Savanna
- ▶ Zone of lake water which is of open water near the surface is Limnetic
- ▶ Ecosystem of Shogran is Temperate deciduous
- ▶ Annual rainfall in grass land is 250-750 mm
- ▶ One of the most important cause of desertification is Deforestation
- ▶ End of earth' is related to Tundra
- ▶ Desert ecosystem of Mianwali is Thal
- ▶ In sub-humid tropical grassland productivity is more than 4000g/m<sup>2</sup>
- ▶ Annual rainfall in deserts is less than 250-500 mm
- ▶ Treeless tundra of high latitude between taiga and polar ice caps is called Arctic tundra
- ▶ The most fragile of all biomes is Tundra
- ▶ Which one is a non-renewable resource? Natural gas
- ▶ Process that supplies food to living things through decaying and decomposition is called Nutrient cycle
- ▶ Balance in the nutrient cycle can be upset when A. Too much food is consumed B. Not enough food is produced C. Decayed nutrients are not returned to the ground



- ▶ Air is 78%
- ▶ % of oxygen and carbon dioxide is Oxygen 21%, CO<sub>2</sub> 0.03%
- ▶ Water constitutes --% of body weight? 70-90%
- ▶ Lakes, streams and rivers has only 1% fresh water
- ▶ Total area of the world under cultivation is 11%
- ▶ Wild life refers to all non cultivated plants and Non domesticated animals
- ▶ Endangered species are Reduced in number
- ▶ 95% of our energy requirements are met from fossil fuels
- ▶ Dead animals, peat, lignite, coal is a correct sequence
- ▶ Hydroelectricity is generated by using \_\_\_\_\_ of falling water? Kinetic energy
- ▶ Driving force for all the cycles in ecosystem is Sun
- ▶ Tides are caused by Gravitational pull of sun
- ▶ Wind blows from area of High pressure to low pressure
- ▶ Geothermal energy is Heat energy trapped underground
- ▶ Hot substance is escaped from inside the earth in the form of Volcanoes, Hot springs & Geysers
- ▶ In oceans of tropical regions, Temp of surface water is 25C and 5C at depth
- ▶ Study of human population and things that affect them is Demography
- ▶ In 1947 population of Pakistan was 32.5 million
- ▶ Rate of population growth in 1980s was 2%
- ▶ Replantation of plants in the areas where they were present earlier is called Reforestation
- ▶ Establishment of new forests where no forests existed previously is called Aforestation
- ▶ Which is environmental buffer? Forests
- ▶ About half of the rain which falls in tropical forests comes from Transpiration of plants
- ▶ Biodiversity is Total number of species in an ecosystem
- ▶ Ozone depletion is commonly caused by CFCs
- ▶ Diseases caused by UV rays in humans are Skin cancers & Cataracts
- ▶ Which gas commonly causes green house effect? Carbon dioxide
- ▶ Causes of green house effect are Over urbanization, Deforestation & Industrialization
- ▶ Sun rays are reradiated from the earth's surface in the form of Long wave radiations
- ▶ Incomplete burning of carbon compounds cause release of Carbon monoxide
- ▶ Acid rain is caused by Sulphur dioxide & Oxides of nitrogen
- ▶ Algal bloom is also called as Eutrophication
- ▶ The chemical wastes from industry is called Industrial effluents
- ▶ Pesticides and fertilizers are also called Agrochemicals
- ▶ Which are more susceptible to attacks of pests? Monocultures
- ▶ Which disease does not match its etiology? Cholera is physical disorder
- ▶ Insulin is a polypeptide hormone which is secreted from the a-cells of pancreas.
- ▶ Insulin decreases blood glucose level by increasing utilization of glucose, glucogenesis
- ▶ Insulin promotes fat (lipogenesis) synthesis.
- ▶ Insulin is an anabolic hormone.
- ▶ 1 kwh is equal to  $3.6 \times 10^6$  power 6



joules

- ▶ Ahmed ibn Yusuf ibn Ibrahim ibn Tammam al-siddiq Al-Baghdadi also known as Ahmed ibn Yusuf al-misri was an Arab mathematician, like his father Yusuf ibn Ibrahim
- ▶ The hormone insulin is Glycolipid
- ▶ The cell wall of oomycetes is chiefly composed of Cellulose
- ▶ One celled green protists are included in Algae
- ▶ Double fertilization occurs in Angiosperms
- ▶ Amphioxus is a Chordate, Protochordate & Lower chordate
- ▶ Adult birds normally possess only one functional Ovary
- ▶ Echinodermata possess bilateral symmetry as larva and radial symmetry as adult
- ▶ Which are triploblastic and acoelomate? Platyhelminthes
- ▶ Which occurs in anaerobic respiration but not in aerobic respiration? Production of ethanol from acetaldehyde
- ▶ Which is the empirical formula of chlorophyll b?  $C_{55}H_{70}O_6N_4Mg$
- ▶ How many moles of carbon dioxide are produced by complete oxidation of one mole of pyruvic acid? 3
- ▶ The food of hydra consists of Small crustaceans
- ▶ Hunger pangs usually begin \_\_\_\_\_ after the previous meal? 12-24 hours
- ▶ If a plasmolysed plant cell is placed in water the cell will? Be deplasmolysed
- ▶ The major constituent of blood plasma is Water
- ▶ Scurvy and beri beri are caused by the deficiency of Vitamin C and B respectively
- ▶ Kangaroo rat most probably would be found in Desert
- ▶ The greatest diversity of animals in the lake is found in which one of the following zones? Littoral zone
- ▶ What is the characteristic feature of consumers? Saprophyte
- ▶ What percentage of light reaching the earth is used in photosynthesis? 1%
- ▶ Competition between species will be greatest if they attempt to occupy the same? Niche
- ▶ In most ecosystems the greatest amount of energy flows through the Herbivores
- ▶ Which of the following relationship is NOT an example of symbiosis? Marchantia sporophyte and gametophyte
- ▶ Animals with greatest number of similarities are grouped together in a/an? Genus
- ▶ The one which is present in all aerobic species? Cytochrome c
- ▶ The structure which has been formed or modified from gill pouches in humans is Eustachian tube
- ▶ The first eukaryotes appeared about \_\_\_\_\_ years ago? 1.5 billion
- ▶ According to Lamarck evolution occurred as the result of? Inheritance of acquired characters
- ▶ The disease in which trans-membrane carrier for the chloride ion is not produced is? Cystic fibrosis
- ▶ The one which can break open a plasmid ring is? Ligase enzyme
- ▶ A genome is full set of genes of an individual
- ▶ Genes will not be found in gene pairs in the sperm cells of frog
- ▶ The red green colour blindness is sex linked recessive condition in man. A father with normal vision and a color blind mother would expect to produce? Color blind sons and daughter with normal vision



- ▶ Which one of the following stage precedes mitosis during cell cycle? G2 phase
- ▶ Klinefelters syndrome, Turners syndrome & Downs syndrome is the result of meiotic non dysjunction
- ▶ Which is correct sequence of stages of prophase 1 of meiosis? Leptotene zygotene pachytene diplotene diakinesis
- ▶ In humans the number of tetrads formed during mitosis is zero
- ▶ The sequence of 3 bases on tRNA which is complementary to condon of mRNA is called? Anticodon
- ▶ Which statement describes the transcription of DNA? It produces mRNA
- ▶ The basic structural unit of a chromosome is? Nucleosome
- ▶ The first stage of development in which a cavity appears is the? Blastula
- ▶ Exposure to low temperature stimulates plants to flower. This is called Vernalisation
- ▶ The cells present in testes and secrete testosterone are Interstitial cells
- ▶ The type of learning in which there is loss or decrease in response to repeated stimuli? Habituation
- ▶ The one which causes contraction of wall of the uterus during and after birth? Oxytocin
- ▶ Sleep movements are a type of turgor movements
- ▶ The one that stores calcium? Sarcoplasmic reticulum
- ▶ Which one of the following is most likely to occur in an animal during winter? Thermogenesis
- ▶ Sebum produced from sebaceous glands in a mammal helps in? Protection against micro organisms
- ▶ The study of fossils is called Palaeontology
- ▶ The experiments on DNA molecules in chromosomes for knowing the basis of inherited diseases are conducted by Molecular biologists
- ▶ Synthetic insulin from pork was formed by which technique? Biotechnology
- ▶ The branch of biology which deals with the study of social behavior and communal life of human beings living in any environment is called Social biology
- ▶ Out of 92 naturally occurring chemical elements how many are considered as bio-elements? 16
- ▶ Oxygen accounts for \_\_\_\_\_ % of totals human body mass? 65%
- ▶ The atoms of different elements combine with each other through ionic or covalent bonding to produce compounds this stable form is called a molecule
- ▶ Which one is a micromolecule? ATP
- ▶ A structure formed by groups of similar cells organized into loose sheets or bundles performing similar functions is called as a tissue
- ▶ In animals coordination is achieved by means of Respiratory system, Nervous system & Endocrine system
- ▶ Group of living organisms of the same species living in the same place at the same time is called Population
- ▶ Different species of plants and animals living in the same habitat is called community
- ▶ A large regional community primarily determined by climate is called Biome
- ▶ The concept that various organisms dominated this planet during various geological time period and thus placing organisms in a time sequence came from the studies by Paleontologist
- ▶ It is possible to date the rocks by comparing the amount of specific radioactive isotopes they contain. Older sediment layers have less amount of these radioactive isotopes as that of the



young ones.

- ▶ An unbroken series of species arranged in ancestors to descendent sequence with each later species having evolved from one that immediately preceded it is called? Phyletic lineage
- ▶ Biological sciences have a set methodology and it is based on experimental inquiry
- ▶ A series of hypothesis supported by the results of many tests is called theory
- ▶ Productive theory is predictive and it has explanatory power
- ▶ Conclusion of Mendels work latter became a scientific law
- ▶ Breeders have developed new and better varieties of food items by using which technique? Genetic engineering
- ▶ Production of genetically identical copies of organisms/cells by asexual reproduction is called cloning
- ▶ Astronauts may use which technique to grow fruits and vegetables? Hydroponic culture technique
- ▶ Pasteurization is used to preserve yogurt and milk
- ▶ Pasteurization was developed by Louis Pasteur.
- ▶ Pasteurization involves heating the substance at high temperature for just few sec
- ▶ What is the mode of transmission of Hepatitis virus? Parental (via blood)
- ▶ Which disease can be controlled by vaccination? Measles
- ▶ Vaccine was first developed by Edward Jenner
- ▶ Which disease has been totally eradicated from the world because of effective vaccination? Small pox
- ▶ Antibiotics are used against microorganisms
- ▶ Antibiotics are always effective against bacteria
- ▶ Antibiotics are used in diseases like tuberculosis and pneumonia
- ▶ Which treatment is instituted in a cancerous patient? Radiotherapy
- ▶ In cloning, the nucleus of a fertilized egg is replaced by the nucleus from the cell of a fully developed individual
- ▶ Division of a single egg into one or more separate embryos in cloning
- ▶ The individual is the mirror image of the parent organism in cloning
- ▶ Removal or degradation of environmental pollutants or toxic materials by living organisms is called? Bioremediation
- ▶ Which of the following is not a viral disease? Tetanus
- ▶ In human body 99% of total mass is formed of 6 bioelements
- ▶ Biological organization is highly complex
- ▶ The arrangement of \_\_\_\_\_ speaks of the division of labour within cell? Organelles
- ▶ Communities are \_\_\_\_\_ collection of organisms? Dynamic
- ▶ The number of species of organisms currently known to science is? 2500000
- ▶ Correct sequence in the biological method? Observation, hypothesis, deduction & testing of deduction
- ▶ The branch of biology which deals with the study of chemical compounds and the chemical processes in the living organisms is called Biochemistry
- ▶ Which one is an organic compound? Lipids
- ▶ Which chemical component has the same % in bacterial as well as the mammalian cell? Water
- ▶ Which chemical component has the greatest contribution in the total mammalian cell weight? Water
- ▶ Reactions in which simple substances



- are combined to form complex substances are called? Anabolic reactions
- ▶ Which is the basic element of organic compounds? Carbon
  - ▶ The bond formed when two or more atoms complete their electron shells by sharing electrons is called? Covalent bond
  - ▶ Carbon atom is? Tetravalent
  - ▶ Which bond provides stability to complex carbohydrate molecules? C-C
  - ▶ % of water in brain cells is 85%
  - ▶ In aqueous medium: Ions and molecules move randomly thus are in more favorable state to react with other molecules and ions
  - ▶ Which of the following substance is most favorable to form structural component of biological membranes? Hydrophobic fats.
  - ▶ The number of calories required to raise the temperature of 1g of water from 15 to 16 °C is called? Specific Heat capacity
  - ▶ The property of water due to which it works as a temperature stabilizer and hence protect living organisms from sudden thermal changes is? High specific heat capacity
  - ▶ Specific heat of vaporization of water is? 574 Kcal/kg
  - ▶ Al-Kindi was a descendant of the Kinda tribe. He was born and educated in Kufa, before going to pursue further studies in Baghdad.
  - ▶ Al-Kindi became a prominent figure in the House of Wisdom, and a number of Abbasid Caliphs appointed him to oversee the translation of Greek scientific and philosophical texts into the Arabic language.
  - ▶ In the field of mathematics, al-Kindi played an important role in introducing Indian numerals to the Islamic and Christian world.
  - ▶ Al-Kindi was a pioneer in cryptanalysis and devised several new methods of breaking ciphers.
  - ▶ Using his mathematical and medical expertise, Al-Kindi was able to develop a scale that would allow doctors to quantify the potency of their medication.
  - ▶ Al-Kindi also experimented with music therapy.
  - ▶ Al-Kindi is still considered to be one of the greatest philosophers of Arab descent, and for this reason is known simply as "The Arab Philosopher".
  - ▶ On account of his learning and aptitude for study, al-Ma'mun appointed Al-Kindi to House of Wisdom, a recently established centre for the translation of Greek philosophical and scientific texts, in Baghdad.
  - ▶ Al-Kindi was also well known for his beautiful calligraphy, and at one point was employed as a calligrapher by al-Mutawakkil.
  - ▶ When al-Ma'mun died, his brother, al-Mu'tasim became Caliph. Al-Kindi's position would be enhanced under al-Mu'tasim, who appointed him as a tutor to his son.
  - ▶ Al-Kindi stated his law of terrestrial gravity: "All terrestrial objects are attracted towards the centre of the Earth."
  - ▶ Al-Kindi was a pioneer in cryptanalysis and cryptology.
  - ▶ Al-Kindi was the first great theoretician of music in the Arab-Islamic World.
  - ▶ Abu Abd Allah Muhammad al-Idrisi was an Arab cartographer, geographer and traveller who lived in Sicily, at the court of King Roger II.
  - ▶ Muhammad al-Idrisi was born in Sabtah, then belonging to the Almoravid Empire (nowadays Ceuta, Spain) and died in Sicily, or maybe in Sabtah.
  - ▶ Al Idrissi was the first one to draw a correct map of the world "lawh al-



along with the numerous satellites that travel around most of them; planet-like objects called asteroids (hundreds of asteroids); chunks of iron and stone called meteoroids; bodies of dust and foreign gases called comets (thousands of comets); and drifting particles called interplanetary dust and electrically charged gas called plasma that together make up the interplanetary medium.

- ▶ Ecosystems involve interactions between living organisms and their environment. This includes both living and non living material in an environment.
- ▶ An ecosystem contains many different types of communities.
- ▶ Communities consist of different populations (groups of organisms of

the same species) in a given geographic area.

- ▶ Long-day plants, which depend on longer photoperiods than the critical photoperiod to flower;
- ▶ Short-day plants, which depend on shorter photoperiods than the critical photoperiod to flower
- ▶ Indifferent plants, whose flowering does not depend on the photoperiod.
- ▶ Phyllotaxis is the way leaves are arranged along shoots.
- ▶ Abu Bakr Muhammad ibn al-Hasan al-Karaji was a Muslim mathematician and engineer of Persian background. His
- ▶ Abu Nasr Mansur ibn Ali ibn was a Muslim mathematician. He is well known for discovering the sine law.





- ▶ All viruses are obligate intracellular parasites, meaning that they depend on a host cell to complete their life cycle. A virus does not have its own metabolism.
- ▶ The fact that viruses are obligate intracellular parasites makes it very unlikely that viruses appeared before cellular organisms during the evolution of life.
- ▶ Some viruses contain DNA (double stranded or single stranded DNA) and others contain RNA viruses (double stranded or single stranded RNA).
- ▶ Viruses inoculate their DNA or RNA molecules into cells and these cells (by means of transcription or reverse transcription and translation) synthesize proteins for the assembly of a new virus. This synthesis is controlled by DNA or RNA molecules of the virus.
- ▶ A typical virus has proteins on its capsid that bind to the outer membrane of the host cell.
- ▶ Within the host cell, the viral DNA is transcribed and messenger RNA is produced. Viral mRNA is then translated and viral proteins are made.
- ▶ Viral polypeptides made within the host cell are cut by enzymes called proteases and then copies of the virus are assembled with the newly formed proteins.
- ▶ When the assembly of new viruses is complete, the cell membrane breaks and the viruses are released to the outside. One sole infected cell can produce hundreds of viruses.
- ▶ Retroviruses are viruses whose genetic material is RNA. HIV and the SARS (severe acute respiratory syndrome) virus are examples of retroviruses.
- ▶ These viruses inoculate their RNA into the host cell and, within that cell, viral RNA is reverse transcribed into DNA.
- ▶ DNA made from viral RNA then controls the synthesis of viral proteins for the assembly of new viruses and the rupture of the host cell to releases them to the outside.
- ▶ The enzyme reverse transcriptase is the catalyst for the reverse transcription of RNA into DNA. This enzyme is part of the virus and is also inoculated into the host cell.
- ▶ HIV is an RNA virus. At its core, there are two strands of RNA and reverse transcriptase molecules. The core is covered by a capsid, which is a layer of proteins. The capsid is then covered by an envelope containing glycoproteins and lipids.
- ▶ The glycoproteins of the HIV envelope are located on the outer surface of the virus and they responsible for recognizing the cells to infect (the HIV host cell is the CD4 lymphocyte) and for attaching the virus to the cell membrane. (CD4 is a receptor glycoprotein of the outer membrane of some lymphocytes).
- ▶ Bacteriophages are viruses specialized in the parasitism of bacteria. They are used in genetic engineering as molecular cloning vehicles to insert recombinant DNA into bacteria. They were also used in the former Soviet Union to treat bacterial infections.
- ▶ Bacteriophages have a polyhedron-like capsid and use DNA as their



genetic material. The "head" of the virus is connected to a tail that ends in small fibers, which helps the virus to attach to the bacterial cell wall and to inject its genetic material into the host.

- ▶ Viruses considered to be in an inactive state are those whose genetic material is within host cells that are not carrying out the synthesis of viral proteins and the assembly of new virus.
- ▶ The life cycle of these viruses can be activated under certain conditions, causing the synthesis of viral proteins to begin, and producing new copies.
- ▶ The virus that causes herpes (herpes virus) is an example of a virus that stays in an inactive state and is sometimes activated.
- ▶ Diseases caused by viruses are the common cold, the flu, mumps, smallpox (considered eradicated nowadays), rubella, measles, AIDS, viral hepatitis, papillomatosis (HPV infection), rabies
- ▶ Diseases caused by viruses are dengue fever, yellow fever, poliomyelitis (a disease almost eradicated in developed countries), hemorrhagic fever from the Ebola virus and SARS (severe acute respiratory syndrome).
- ▶ SARS is a disease that appeared in 2003 with epidemic features in the province of Guangdong, in eastern China.
- ▶ SARS is caused by a virus from the coronavirus group, an RNA virus (retrovirus). SARS can be fatal.
- ▶ Crystallization is the process of the transformation of viral components into organized solid particles.
- ▶ The crystallization of biological macromolecules, including viral components, is used to study structural characteristics, through X-rays or laser beams, for example.
- ▶ Degenerative diseases are common non-infectious diseases whose

incidences increase with age.

- ▶ Risk factors for a disease are everything that contributes to an increased risk of the disease appearing.
- ▶ For most cardiovascular diseases, tobacco smoking and diabetes mellitus are both important risk factors; for some cancers having a genetic cause, a positive family history is a risk factor, etc.
- ▶ The main human degenerative diseases are divided into three groups: cardiovascular diseases, neoplastic diseases and degenerative diseases of the nervous system.
- ▶ The main cardiovascular diseases are hypertension, cardiopathies, including coronary disease and myocardial infarction, and cerebrovascular accidents (CVAs, or strokes).
- ▶ Neoplasms are benign tumors and cancers.
- ▶ The main degenerative diseases of the nervous system are Alzheimer's disease and Parkinson's disease.
- ▶ Hypertension is a disease in which arterial blood pressure is abnormally high, during systole or during diastole.
- ▶ Hypertension, or high blood pressure, is a condition that must be diagnosed and treated, since it produces irreversible injuries to arteries and, later, it causes other severe diseases in organs such as the heart, brain, kidneys, retina, etc.
- ▶ The main risks factors for hypertension are tobacco smoking, stress, obesity, a sedentary lifestyle and alcoholism.
- ▶ The maximum blood pressure is the pressure on the wall of arteries during systole, that is, when the heart is pumping blood to arterial vessels.
- ▶ The minimum blood pressure is the pressure on the wall of arteries during diastole, that is, when the heart ventricles are relaxing and filling with blood



- ▶ The main degenerative diseases of the heart are heart failure, arrhythmias, valvular heart diseases, coronary insufficiency and myocardial infarction.
- ▶ Coronary disease, or coronary insufficiency, is a disease in which there is total or partial obstruction of one or more of the arteries that irrigate the heart musculature; that is, obstruction of the coronary arteries.
- ▶ The main risk factors for coronary disease are tobacco smoking, diabetes mellitus, hypertension, hypercholesterolemia (a high level of bad cholesterol and low level of good cholesterol), stress, alcoholism and a sedentary lifestyle.
- ▶ Coronary disease may manifest into one of two ways, angina pectoris or myocardial infarction.
- ▶ Myocardial infarction, or heart attack, is the condition in which an area of heart tissue or the entire heart muscle dies by hypoxia due to lack of blood irrigation.
- ▶ Myocardial infarction is a severe disease since the heart can fail depending on the extent of its damage, becoming unable to pump blood to the lungs or to the body, or even ceasing to beat (causing death).
- ▶ The main cause of myocardial infarction is coronary obstruction, the blockage of the arteries that carry arterial blood to the heart muscle.
- ▶ Other events such as hemodynamic shock (circulation stoppage due to large hemorrhages, for example) can also cause myocardial infarction.
- ▶ A coronary artery bypass graft is a type of surgical myocardial revascularization; or rather, a way to provide blood to a myocardium whose blood supply is impaired or blocked due to coronary disease.
- ▶ The blood vessel grafts are done with part of the saphenous vein in the leg or of mammary artery in the chest, or even the radial artery in the forearm.
- ▶ A cerebrovascular accident (CVA), also known as a stroke, is the generic name given to infarction (tissue and cellular death by hypoxia) of areas of the brain due to vascular obstruction or hemorrhages.
- ▶ CVAs are divided into ischemic and hemorrhagic. In ischemic CVAs, the blockage of arteries that carry blood to the brain occurs; its cause is generally atherosclerosis (atheroma formation) of these vessels.
- ▶ In hemorrhagic CVAs, one or more blood vessels in the brain ruptures and leaks blood, increasing intracranial pressure and therefore interrupting blood flow in some areas of the brain.
- ▶ The main risk factors for cerebrovascular accidents are hypertension, hypercholesterolemia, tobacco smoking and old age.
- ▶ Neoplasia is any abnormal and uncontrolled proliferation of cells of in an organism.
- ▶ Neoplasias can be benign or malignant. Benign neoplasias are when cell proliferation is limited to a given site of the body and the neoplastic cells do not spread to other close or distant regions through circulation.
- ▶ Malignant neoplasias are when neoplastic cells disseminate over a distance to other sites and organs of the body, a process called metastasis, where they continue to proliferate.
- ▶ Malignant neoplasias injure tissues and, if not eradicated, they are fatal. A benign neoplasm can also be deadly when it forms a tumor that grows and compresses vital organs.
- ▶ Not every tumor is neoplastic and not every neoplasia creates a tumor.
- ▶ Neoplasias can form tumors, some of them very large, through the accumulation of neoplastic cells in the region where the neoplasia began or in distant areas.





- ▶ Cancer is a synonym for malignant neoplasia.
- ▶ Cancers are malignant neoplasias, that is, the abnormal and uncontrolled proliferation of cells that can spread to other sites of the body.
- ▶ Cancer spreading over distances usually occurs through blood or lymphatic vessels.
- ▶ Neoplasias appear due to DNA mutations in genes that regulate cellular proliferation, thus making the cell lose its capacity to control and limit its division by mitosis.
- ▶ The cell then divides continuously and uncontrollably and this defect is transmitted to its daughter cells.
- ▶ Carcinogens are factors capable of producing neoplasms. Any mutagen, a substance that can induce DNA mutation, is a potential carcinogen.
- ▶ Examples of carcinogens are radiation, nitrous acid, many substances inhaled through tobacco smoking and the human papilloma virus (HPV).
- ▶ In neoplastic tumors, a phenomenon called angiogenesis occurs. Angiogenesis is the formation of new blood vessels.
- ▶ Neoplastic cells induce the formation of new blood vessels to irrigate and drain neoplastic tissue.
- ▶ Angiogenesis is important because tumor growth depends on it. A lot of research on cancer has tried to discover natural and synthetic substances to inhibit angiogenesis.
- ▶ Epithelial cancers, of the skin as well as of the internal organs, are more common because epithelial tissues are more exposed to carcinogens.
- ▶ The proportional incidence of the many types of cancer varies according to the population studied.
- ▶ The main risk factor for lung cancer is tobacco smoking. The large number of cases of this type of cancer is due to the large number of smokers worldwide.
- ▶ The main risk factor for skin cancer is the exposure of the skin to sun without protection against ultraviolet radiation (a potential carcinogen).
- ▶ The most lethal skin cancer is melanoma.
- ▶ If the cancer is in its initial stage, treatment is often done by the surgical removal of neoplastic tissue.
- ▶ Cancers that have already spread are often treated with radiation (radiotherapy) and anti-mitotic drugs (chemotherapy).
- ▶ The main degenerative diseases of the nervous system are Alzheimer's disease and Parkinson's disease.
- ▶ Degenerative diseases of the nervous system are caused by progressive tissue degradation or the loss of neurons in some regions of the nervous system.
- ▶ Alzheimer's disease is a degenerative disease of the central nervous system in which the patient develops progressive dementia and an alteration of mental functions.
- ▶ The disease generally appears after 40 years of age and is more frequent in the elderly.
- ▶ Parkinson's disease is a degenerative disease of the nervous system in which the main manifestations are progressive motor disturbances, such as tremors of feet, hands and mandibles (jaws) and walking and balance impairments.
- ▶ Parkinson's disease is due to the degeneration of dopaminergic motor neurons, which are motor neurons that use dopamine as a neurotransmitter, located in a specific region of the brain, the mesencephalon.
- ▶ Degeneration creates a deficiency of dopamine in the nervous system. (Parkinson's disease should not be



- confused with other causes of tremors, such as the use of some medicines.)
- ▶ A prion is an infectious (transmissible) protein able to replicate by transforming other proteins into a copy of the prion. The mechanism of copying is not yet understood by science.
- ▶ The hypothesis was developed based on research on a nervous system disease known as Creutzfeldt-Jacob disease, which is epidemiologically associated with a bovine disease called bovine spongiform encephalitis (the mad cow disease).
- ▶ Research discovered that the infectious agent that causes those diseases, surprisingly, was a protein capable of copying itself and of being transmitted by ingestion (the reason why meat from contaminated animals cannot be consumed), inoculation and even heredity.
- ▶ The main known human diseases caused by prions are Creutzfeldt-Jacob disease (CJD), kuru and Gerstmann-Sträussle-Scheinker disease (GSS).
- ▶ The hypothesis that many other diseases of unknown etiological agents are actually caused by self-replicating infectious proteins is strong.
- ▶ Worm infections are human diseases caused by platyhelminthes (flatworms) or nematodes (roundworms).
- ▶ The most important human worm infections are schistosomiasis, taeniasis, cysticercosis, ascariasis and ancylostomiasis (hookworm infection).
- ▶ Other important worm infections caused by platyhelminthes are: fascioliasis, caused by *Fasciola hepatica*, which attacks the liver and the bile ducts
- ▶ Hydatid disease, which is also known as echinococcosis, and is caused by a taenia-like parasite and transmitted by the feces of dogs in contact with sheep, with a clinical manifestation

similar to cysticercosis.

- ▶ Important infections caused by roundworms are: strongyloidiasis, from the agent *Strongyloides stercoralis*, a common opportunistic disease in AIDS;
- ▶ Filariasis, also known as elephantiasis, transmitted by mosquitoes of the *Culex* genus, caused by *Wuchereria bancrofti*
- ▶ Other thread-like worms, and which is manifest by the obstruction and fibrosis of lymphatic vessels causing the swelling (lymphedema) of limbs; enterobiasis (pinworm infection), caused by *Enterobius vermicularis*,
- ▶ A worm that lives as a parasites in the colon and the human perianal region; and cutaneous larva migrans, an ancylostomiasis of the skin caused by *Ancylostoma braziliensis*.
- ▶ Schistosomiasis is a worm infection caused by schistosomes, a species of flatworms (platyhelminthes).
- ▶ The main species of schistosome found in Latin America is *Schistosoma mansoni*.
- ▶ Schistosomes are dioecious, meaning that the species has separate sexes and male and female individuals.
- ▶ The intermediate host of the schistosome is a gastropod mollusc, a snail of the Planorbidae family and *Biomphalaria* genus. The snail vector of schistosomiasis lives in fresh water, such as in lagoons and creeks.
- ▶ Male and female adult schistosomes live within blood vessels of the human intestines.
- ▶ Schistosomiasis has acute and chronic phases.
- ▶ Taenias, also known as tapeworms, are species of platyhelminth animals (flatworms). The main diseases caused by taenia are taeniasis and cysticercosis.
- ▶ Taenias are monoecious



(hermaphrodite); the same individual has female and male reproductive organs and undergoes self-fertilization.

- ▶ The two main species of taenia that cause disease in humans are *Taenia solium*, or the pork tapeworm, and *Taenia saginata*, or the beef tapeworm.
- ▶ In addition to these species are the fish tapeworm, or *Diphyllobothrium latum*, and a tapeworm called *Echinococcus granulosus*, which lives in dogs and causes the severe disease known as hydatid disease or echinococcosis, in humans.
- ▶ Tapeworms have hooks and sucking structures on their heads (scolex) that attach the parasite to the gut wall; these structures often do not injure the host tissue.
- ▶ The parasite obtains food and carries out gas exchange through absorption and diffusion across its skin. Because it is a platyhelminth, it does not have a digestive system or a circulatory system.
- ▶ The body of a tapeworm is made of segments called proglottids. Proglottids are the reproductive structures of taenia and contain the organs that produce male and female gametes.
- ▶ As the proglottids become distant from the scolex (head), they mature. Mature proglottids can fertilize themselves or neighboring ones and the eggs formed are stored inside them.
- ▶ Proglottids called pregnant proglottids, full of eggs, detach from the body of the worm and are eliminated with human feces.
- ▶ The intermediate hosts of *Taenia solium* are pigs and the intermediate hosts of *Taenia saginata* are cattle.
- ▶ Pregnant proglottids with taenia eggs are released together with human feces.
- ▶ Taeniasis is the parasitic disease

caused by the adult tapeworm within the human intestine.

- ▶ Cysticercosis occurs when humans ingest the eggs or pregnant proglottids of taenias, for example, through poorly washed food or self-infection.
- ▶ In cysticercosis, humans assume the role of the intermediate hosts of the parasite and the cysticerci develop within human organs such as muscles, the brain, the eyes and subcutaneous tissue.
- ▶ The infestation of the brain by cysticerci, a condition known as neurocysticercosis, is extremely severe and may lead to death.
- ▶ In the normal life cycle of taenia, humans are the definitive hosts and develop taeniasis, a less serious disease, and not cysticercosis.
- ▶ If a person eats raw or undercooked meat infected by *Taenia solium* or *Taenia saginata*, he or she will develop the disease taeniasis.
- ▶ The ingestion of contaminated raw or undercooked meat means that cysticerci are being ingested.
- ▶ Taeniasis patients may develop the most severe form of the worm infection, cysticercosis, because their feces contain taenia eggs and pregnant proglottids, carrying the risk of self infection due to bad hygienic habits, such as not washing the hands after defecation.
- ▶ If these individuals ingest the eggs of the parasite, they can also develop cysticercosis.
- ▶ The main prophylactic measures against taeniasis and cysticercosis are: not to ingest raw or undercooked pork or beef; sanitary education of the people; appropriate treatment of sewage; and adequate treatment of infected people.
- ▶ *Ascaris*, or *Ascaris lumbricoides*, is an animal of the nematode phylum; or rather, a roundworm. *Ascaris* causes



ascariasis, a common worm infection of the intestine.

- ▶ Ascaris live within the human gut and feed on the food ingested by the infected person.
- ▶ Ascaris is a monoxenous parasite; its life cycle is dependent on only one host and, therefore, it does not have intermediate host.
- ▶ Adult ascaris that live within the human intestine can release up to 200,000 eggs per day. The eggs are eliminated with human feces and mature in the environment under certain heat and moisture conditions.
- ▶ In the pulmonary phase, ascaris infestation causes coughing, hemoptysis, dyspnea, fever, fatigue and may cause a special kind of pneumonia called eosinophilic pneumonia.
- ▶ During the intestinal phase, the symptoms are due to robbing of nutrients from the host and therefore hunger and weight loss may appear.
- ▶ Masses of ascaris inside the bowels can cause severe intestinal obstructions.
- ▶ The main prophylactic measures against ascariasis are: the effective washing of vegetables and other foods; basic sanitary conditions and the appropriate treatment of sewage; hygiene education for people; and measures against insects that can carry the eggs of the parasite, such as flies and cockroaches.
- ▶ Ancylostomiasis is a disease caused by *Ancylostoma duodenale* or *Necator americanus*, both hookworms belonging to the nematode phylum (roundworms).
- ▶ Ancylostomiasis caused by these worms is also called hookworm disease.
- ▶ Both *Ancylostoma duodenale* and *Necator americanus* have mouthparts with hooks or "teeth" that help to

attach the parasite to the human intestine wall and facilitate the tissue injury necessary to drain blood from the host.

- ▶ Hookworms are monoxenous, as their life cycle depends on only one host.
- ▶ Adult hookworms within the human intestine release eggs that are eliminated with human feces.
- ▶ The main prophylactic measures against hookworm disease are: to avoid walking barefoot on soil suspected of contamination; basic sanitary conditions and the appropriate treatment of sewage; and treatment of infected people.
- ▶ The main viral diseases transmitted by respiratory secretions (sneezes, coughing) and by saliva drops are the flu, the mumps, smallpox (variola, already considered eradicated), rubella, measles, and SARS.
- ▶ The main viral diseases transmitted through blood or sexual contact are AIDS, hepatitis B, hepatitis C, HPV, and Ebola hemorrhagic fever.
- ▶ The main viral diseases transmitted by animal vectors are rabies, dengue fever, and yellow fever.
- ▶ Some viral diseases transmitted by the fecal-oral route, including contaminated food, are hepatitis A, and poliomyelitis (a disease almost eradicated in many parts of the world).
- ▶ The flu is a disease caused by the influenza virus, a highly mutant DNA virus.
- ▶ If it occurs during pregnancy, rubella is a dangerous disease because the virus crosses the placenta and contaminates the fetus. The fetus then develops congenital rubella, a teratogenic (cause of malformations) disease.
- ▶ Congenital rubella may be prevented by vaccination. A doctor must always be consulted before vaccination.
- ▶ The vaccines used against



poliomyelitis are the Sabin vaccine and the Salk vaccine. The Sabin vaccine contains the attenuated virus and is taken through oral drops. The Salk vaccine is made of the dead virus and is administered by injection.

- ▶ Rabies, also known as hydrophobia, is a viral disease. It is found among dogs, cats, bats and other wild mammals. The transmission to humans occurs through the saliva of contaminated animals, mainly through bites.
- ▶ The rabies virus is neurotropic and attacks the central nervous system in a fast and lethal fashion. The prevention of the disease is done through the prophylactic vaccination of animals and humans. The treatment is done with an anti-rabies serum containing specific antibodies against the virus.
- ▶ Smallpox is a viral infection like measles. Smallpox is transmitted by respiratory secretions, saliva and objects in contact with contaminated patients.
- ▶ Measles is also transmitted by saliva and respiratory secretions. It is characterized by exanthems (red spots on the skin), fever, malaise and lymphadenomegaly (enlarged lymph nodes). If not treated, measles complications can cause death.
- ▶ Smallpox killed thousands of people around the world at the end of the 19th century and the beginning of the 20th century, but today it has almost been eradicated by vaccination.
- ▶ There are many types of viral hepatitis. The most important ones, epidemiologically, are hepatitis A, hepatitis B and hepatitis C.
- ▶ Hepatitis A is an acute disease with a low mortality rate caused by the hepatitis A virus (an RNA virus).
- ▶ Hepatitis A is transmitted by the fecal-oral route, often through the contamination of foods such as

vegetables and seafood.

- ▶ Blood tests show increased levels of hepatic enzymes caused by injuries to liver cells. Hepatitis A often heals naturally after 4 to 6 weeks.
- ▶ Hepatitis B is a disease caused by a DNA virus. The transmission is by blood (wounds, sexual relations, transfusions, accidents with contaminated material, etc.).
- ▶ Hepatitis C is caused by an RNA virus and is transmitted through blood (like hepatitis B, through wounds, sexual relations, transfusions, accidents with contaminated material, etc.).
- ▶ PCR stands for polymerase chain reaction
- ▶ Hepatitis is the generic name for the inflammation of the liver. There are bacterial hepatitis, such as in leptospirosis, and toxic hepatitis, such as those caused by alcohol, medicines or inhaled chemical products.
- ▶ The main human viral infections transmitted by mosquitoes are dengue fever and yellow fever.
- ▶ Dengue, or dengue fever, is an epidemic disease in some countries and its most dangerous form is hemorrhagic dengue.
- ▶ Dengue is prevalent in tropical and subtropical regions of Asia, Africa and South America and is transmitted by the bite of the *Aedes aegypti* mosquito, a daytime mosquito.
- ▶ Myalgia is a muscle pain.
- ▶ In hemorrhagic dengue, a high fever, with or without convulsions, and hemorrhages may occur, leading to circulatory failure and death.
- ▶ Yellow fever is a viral infection that occurs mainly in Central Africa and in the Amazon region of South America.
- ▶ Yellow fever is prevented through vaccination and is transmitted by many species of mosquitoes of the *Aedes* genus, including *Aedes aegypti*.



## Haemagogus.

- ▶ In the case of HIV, the production of a vaccine is difficult because the virus is highly mutant and evades the effect of antibodies.
- ▶ Antibacterial drugs, potent against a large variety of bacteria, are not effective against viruses, which are intracellular parasites.
- ▶ A viral infection is difficult to treat since antiviral drugs are too specific and have a limited effectiveness.
- ▶ In general, antiviral drugs reduce the viral load (number of viruses), relieving symptoms.
- ▶ Antivirals (and antiretrovirals, drugs that act against RNA viruses) often inhibit the action of specific enzymes that participate in the virus life cycle.
- ▶ The main human diseases caused by fungi in immunocompetent patients are coccidioidomycosis, histoplasmosis, blastomycosis, paracoccidioidomycosis, or South American blastomycosis, sporotrichosis and onychomycosis (nail mycosis).
- ▶ In immuno-deficient patients, in addition to the diseases mentioned above, other fungal diseases such as systemic candidiasis, aspergillosis, cryptococcosis and other opportunistic diseases may occur.
- ▶ Moniliasis is one of the most common opportunistic diseases in AIDS patients.
- ▶ The etiological agent of moniliasis is *Candida albicans*, a fungus.
- ▶ Moniliasis is also known as mucocutaneous candidiasis.
- ▶ In AIDS, moniliasis can complicate and turn into systemic candidiasis, affecting many organs.
- ▶ Bat and pigeon feces can carry *Histoplasma capsulatum*, the fungal agent of histoplasmosis.

- ▶ Cryptococcosis is another fungal disease transmitted by pigeon feces.
- ▶ Topical or systemic azoles (such as itraconazole, fluconazole and others), amphotericin B, echinocandins (caspofungin, micafungin), terbinafine and griseofulvin are examples of antifungal drugs.
- ▶ Those diseases are caused by protozoans, organisms of the kingdom Protista.
- ▶ The etiological agent of Chagas' disease is *Trypanosoma cruzi*. The name "cruzi" was given in honor of the Brazilian doctor Oswaldo Cruz. The disease was named after the Brazilian doctor Carlos Chagas.
- ▶ In definitive hosts as well as in triatomine bugs (intermediate hosts), the protozoan that causes Chagas' disease alternates between mastigote (flagellate) and amastigote forms as well as intermediate forms between these forms.
- ▶ The vector of Chagas' disease is its intermediate host, a triatomine bug. The main species is *Triatoma infestans*.
- ▶ Hemipteran insects, such as triatomines, have sucking mouthparts that can be used to suck blood from animals or organic fluids from plants.
- ▶ *Trypanosoma cruzi* is a heteroxenous parasite, meaning that it has an intermediate host, the triatomine bug, and a definitive host, the human.
- ▶ The triatomine bug becomes infected by sucking the blood of a contaminated person. Within the bug's gut, the protozoan reproduces.
- ▶ The incubation period is the time interval between the infection by an agent that causes disease and the first signs or symptoms of the disease.
- ▶ Chagas' disease may or may not present an acute phase. When it is present, the incubation period is about 5 to 14 days. The chronic phase,



however, can appear more than 10 years after the infection.

- ▶ During the chronic phase of Chagas' disease, which manifests years after the infection, trypanosoma infest the muscles of the heart, causing insufficient blood pumping, pulmonary edema and an increase in the size of the organ (cardiomegaly).
- ▶ Prophylaxis is measures taken to prevent diseases. For example, the use of condoms during sexual relations is a prophylaxis against contamination by agents that cause STIs (sexually transmitted infections).
- ▶ The etiological agents of malaria are protozoa of the genus Plasmodium.
- ▶ There are four different types of plasmodia that cause malaria: Plasmodium malariae, Plasmodium vivax, Plasmodium falciparum and Plasmodium ovale.
- ▶ Plasmodium infects human blood, causing the destruction of red blood cells as well as affecting the liver.
- ▶ Malaria is characterized by periodic episodes of fever, chills and sweating that may be accompanied by headaches, nausea, vomiting and jaundice.
- ▶ The destruction of red blood cells may lead to anemia and hypoxemia.
- ▶ Infection by Plasmodium falciparum, if not treated, can cause other complications and even death.
- ▶ The vector of malaria is a mosquito of the genus Anopheles, also called anopheline. As opposed to the mosquito vector of dengue fever, the anopheline has nocturnal habits.
- ▶ In the life cycle of plasmodium, humans are the intermediate hosts (where asexual reproduction takes place) and the vector mosquito is the definitive host (where sexual reproduction occurs).
- ▶ The typical chills and fever episodes of malaria correspond to the phase when

red blood cells are destroyed after the erythrocytic schizogony of the plasmodium life cycle.

- ▶ The main preventive measures against malaria are the elimination of the vector mosquito, the treatment of infected people, avoidance of mosquito bites, information for travelers to endemic areas and the use of preventive medicines.
- ▶ Some other important protozoan infections are amoebiasis, giardiasis, trichomoniasis, leishmaniasis, toxoplasmosis and meningoencephalitis by free-living amoebas.
- ▶ Amebiasis is caused by the protozoan Entamoeba histolytica, or simply amoeba.
- ▶ Giardiasis is a protozoa infection caused by Giardia lamblia, or simply giardia, a flagellate protozoan.
- ▶ The transmission is fecal-oral, through contaminated water and food or carried by insects such as cockroaches and flies.
- ▶ Giardiasis manifests like amebiasis, as enteritis with diarrhea, abdominal pain, weight loss and anemia.
- ▶ Trichomoniasis is an extra-intestinal protozoa infection caused by Trichomonas vaginalis, a flagellate protozoan.
- ▶ Trichomoniasis is an STI because its main mode of transmission is sexual contact
- ▶ There are two main forms of leishmaniasis: cutaneous leishmaniasis and visceral leishmaniasis (also known as kala-azar).
- ▶ The etiological agent of cutaneous leishmaniasis is the protozoan Leishmania braziliensis.
- ▶ The transmission, like in the visceral form of the disease, is through the bite of the sand fly Lutzomyia (named after the Brazilian scientist Adolfo Lutz), the



vector host.

- ▶ Cutaneous leishmaniasis develops at the bite site where the parasite establishes itself.
- ▶ Visceral leishmaniasis is caused by the protozoan *Leishmania donovani*.
- ▶ The transmission is similar to cutaneous leishmaniasis, through the bite of sandflies. The affected organs are generally the liver, the spleen and the bone marrow.
- ▶ Toxoplasmosis is caused by the protozoa *Toxoplasma gondii*, a sporozoa.
- ▶ Toxoplasmosis is a disease transmitted by cats, which are the definitive hosts of the parasite. Cats eliminate toxoplasma oocysts in feces; the oocysts are extremely resistant and remain viable for months in the environment.
- ▶ In toxoplasmosis, the cystic form of the parasite invades tissues of the body, including the brain and the retina.
- ▶ The main human bacterial infections transmitted by respiratory secretions (sneezes, coughing) and saliva are bacterial pneumonia, tuberculosis, whooping cough (pertussis), diphtheria, and bacterial meningitis.
- ▶ The main bacterial diseases transmitted by blood or sexual contact are: gonorrhea and syphilis.
- ▶ The main bacterial diseases transmitted by animal vectors are the bubonic plague, endemic typhus, and leptospirosis.
- ▶ Some bacterial diseases transmitted through the fecal-oral route and contaminated food are cholera and typhoid fever.
- ▶ Other important bacterial infections are: Hansen's disease, possibly transmitted by saliva and contact with injured skin and mucosae; trachoma, an eye disease transmitted by ocular secretions; and tetanus, which is transmitted when the etiological agent

enters the body through skin wounds.

- ▶ Tuberculosis is a disease caused by *Mycobacterium tuberculosis*, a bacteria which attacks other organs of the body but mainly the lungs, leading to respiratory failure.
- ▶ Before 1940, tuberculosis was one of the main causes of death in the USA and Europe. The disease can remain latent, without manifestation for several years, and even throughout the life of a person.
- ▶ Tuberculosis is highly contagious, transmitted via the air through sneezes and coughs from a person with the active disease. Transmission is common between members of the same family or even in work environments.
- ▶ The vaccine against tuberculosis is called BCG (*Bacillus Calmette-Guérin*).
- ▶ Pneumonia is the generic name for the inflammation of the lungs. Besides bacterial pneumonia, pneumonia can be caused by viruses, fungi, toxins, etc.
- ▶ The etiological agent of Hansen's disease is the bacteria *Mycobacterium leprae*.
- ▶ Hansen's disease is a chronic disease (slow progression) that generally attacks the skin and the peripheral nerves, although other areas of the body can be affected.
- ▶ In the past, Hansen's disease was called leprosy.
- ▶ Cholera is a bacterial disease caused by *Vibrio cholerae*. The disease is transmitted via the fecal-oral route and the main mode of transmission is the ingestion of contaminated water or food.
- ▶ Inside the human gut, the cholera vibron releases toxins called enterotoxins. The infection can cause intense diarrhea, vomiting, dehydration and even death in more severe cases.
- ▶ Meningitis is the generic name given



- to the inflammation of the meninges, the membranes that cover the central nervous system.
- ▶ Meningitis can have several causes (infectious, toxic, traumatic, neoplastic infestation, autoimmune). Bacterial infections caused by meningococcus, haemophilus, pneumococcus or by tuberculosis bacteria are severe and contagious.
  - ▶ Syphilis is a disease caused by the bacteria *Treponema pallidum*. Before the discovery of penicillin, syphilis was a fatal disease.
  - ▶ An antibiogram is a laboratory test intended to guide the choice of the adequate antibiotic to treat a given bacterial infection.
  - ▶ In an antibiogram, cultures of bacteria obtained from tissues contaminated by the infection under study are submitted to the effect of different antibiotics.
  - ▶ The antibiogram is a very important tool to avoid the excessive and inefficient use of antibiotics and the emergence of multiresistant bacteria.
  - ▶ Parasitism is an inharmonious interspecific ecological interaction in which individuals of a species (the parasites) use the organs, tissues or cells of individuals of another species (the hosts), causing them harm.
  - ▶ Ectoparasites are parasites that explore the external surface of the host (such as mites that are parasitic to the skin). Endoparasites are parasites that live within the body of the host (such as the taenia).
  - ▶ Parasites that require only one host are called monoxenous parasites. Parasites that need more than one host to complete their life cycle are called heteroxenous parasites.
  - ▶ The criterion used to classify hosts as intermediate hosts or as definitive hosts is the type of reproduction of the parasite, sexual or asexual, within the host.
  - ▶ The vectors of a parasite are organisms able to transport the parasite during stages of its life cycle, making the infection of other hosts possible.
  - ▶ Mosquito *Aedes aegypti* is the vector of the dengue virus; triatomine bugs are vectors of *Trypanosoma cruzi*, the protozoan that causes Chagas' disease; and mice are vectors of leptospira, the bacteria that cause leptospirosis.
  - ▶ An etiological agent of disease is the agent that causes the disease. It may be a living organism, a substance or an environmental circumstance.
  - ▶ Endemic diseases are those that often affect people in a given place, whether many or few individuals. Epidemic diseases are those that spread rapidly with a high number of new cases.
  - ▶ An endemic disease can turn into an epidemic disease.
  - ▶ The chemical elements that make up the majority of the molecules of living organisms are oxygen (O), carbon (C), hydrogen (H) and nitrogen (N).<sup>1</sup>
  - ▶ The most important inorganic substances for living organisms are water, mineral salts, carbon dioxide and molecular oxygen. (There are several other inorganic substances without which cells would die.)
  - ▶ Organic molecules, such as proteins, lipids and carbohydrates, perform several functions in living organisms.
  - ▶ Organic molecules are carrying out a structural function when they form a part of cell membranes, cytoskeletons, organ and blood vessel walls, bones, cartilage and, in plants, of conducting and supporting tissues.
  - ▶ Since they are complex molecules, which contain many chemical bonds, organic molecules store a large amount of energy.
  - ▶ Glucose, for example, is the main energy source for the formation of ATP



(adenosine triphosphate), a molecule that is necessary for several metabolic reactions.

- ▶ ATP is also an organic molecule and is the energy source for many biochemical reactions. Fat, proteins and some types of organic polymers, such as starch and glycogen, which are polymers of glucose, are energy reservoirs for organisms.
- ▶ Polymers are macromolecules made up by the union of several smaller identical molecules, which are then called monomers.
- ▶ Biopolymers are polymers present in living organisms. Cellulose, starch, and glycogen, for example, are polymers of glucose.
- ▶ Carbohydrates are also known as sugars (starches, cellulose and other substances are also carbohydrates).
- ▶ Carbohydrates are polyhydroxy aldehydes or polyhydroxy ketones (polyalcohol aldehydes or polyalcohol ketones).
- ▶ Polyhydroxylated aldehydes are called aldoses and polyhydroxylated ketones are called ketoses.
- ▶ The molecular formula for glucose is  $C_6H_{12}O_6$ .
- ▶ Structurally, glucose is a hexagonal ring formed by one atom of oxygen and five atoms of carbon.
- ▶ A hydroxyl radical and a hydrogen atom are bound to each carbon atom of the ring, except for one of the carbon atoms bound to the oxygen atom of the ring, which binds to a  $CH_2OH$  radical.
- ▶ Monosaccharides are simple carbohydrates molecules that cannot be broken down into smaller molecules of other carbohydrates.
- ▶ Oligosaccharides are carbohydrates made by bond of between a maximum of 10 monosaccharides. Polysaccharides are polymers of monosaccharides made of more than

10 units of such monomers.

- ▶ The most important polysaccharides are cellulose, starch, glycogen and chitin.
- ▶ Monosaccharides are simple carbohydrates molecules that cannot be broken down into other carbohydrates.
- ▶ Glucose and fructose are examples of monosaccharides.
- ▶ Disaccharides are carbohydrates made up of two monosaccharides and which are missing one molecule of water (dehydration).
- ▶ The chemical bond between two monosaccharides is known as a glycosidic bond.
- ▶ Hexoses are carbohydrates made up of six carbon atoms. Glucose, fructose and galactose are all examples of hexoses. Hexoses have an important biological role, as they are energy sources for the metabolism.
- ▶ Pentoses are carbohydrates made up of five carbon atoms.
- ▶ The DNA molecule is made up of a sequence of molecules called nucleotides.
- ▶ Each nucleotide is formed by the bonding of a pentose called deoxyribose with phosphoric acid and a nitrogenous base (A, T, C or G). RNA is also formed by a sequence of nucleotides.
- ▶ RNA nucleotides are made through the bonding of one ribose (a pentose) molecule with one phosphoric acid molecule and one nitrogenous base (A, U, C or G).
- ▶ Pentoses are fundamental components of DNA and RNA.
- ▶ Polysaccharides have an energy storage function and a structural function.
- ▶ Polysaccharides ingested by living organisms in the food chain are



important sources of carbohydrates for the energetic metabolism of organisms of the next trophic levels.

- ▶ Carbohydrates are also known as sugars (starches, cellulose and other substances are also carbohydrates).
- ▶ Carbohydrates are polyhydroxy aldehydes or polyhydroxy ketones (polyalcohol aldehydes or polyalcohol ketones).
- ▶ Polyhydroxylated aldehydes are called aldoses and polyhydroxylated ketones are called ketoses.
- ▶ Approximately 65% of human mass is made up of water. The brain, for example, is around 90% water; muscles, 85%; and bones are between 25% and 40% water.
- ▶ The young have a greater proportion of water than the elderly.
- ▶ Ions are atoms or substances that are electrically charged due to losing or gaining electrons.
- ▶ The two types of ions are cations and anions. Cations are ions with a positive total electric charge and anions are ions with a negative total electric charge.
- ▶ The main cations found in living organisms are the sodium cation ( $\text{Na}^+$ ), the potassium cation ( $\text{K}^+$ ), the calcium cation ( $\text{Ca}^{++}$ ), iron cations ( $\text{Fe}^{++}$ ,  $\text{Fe}^{+++}$ ), the magnesium cation ( $\text{Mg}^{++}$ ), the zinc cation ( $\text{Zn}^{++}$ ) and the manganese cation ( $\text{Mn}^{++}$ ).
- ▶ The main anions found in living organisms are the chloride anion ( $\text{Cl}^-$ ), the phosphate anion ( $\text{PO}_4^{--}$ ), the bicarbonate anion ( $\text{HCO}_3^-$ ), the nitrate anion ( $\text{NO}_3^-$ ) and the sulfate anion ( $\text{SO}_4^-$ ).
- ▶ Osmotic pressure depends on the number of particles dissolved in a solution and not on the nature of such particles.
- ▶ Mineral salts, glucose, proteins and urea are the main regulating particles for the osmolarity of an organism.
- ▶ The electric activity of a cell, in neurons, for example, depends on the different concentrations of positive and negative ions between the inner and the outer surfaces of the cell membrane. Mineral salts are responsible for that voltage.
- ▶ The cell membrane of a non-excited cell normally has a negative inside and a positive outside. This electrical situation is maintained by ion transport across the membrane.
- ▶ The potential of hydrogen (pH) is a measure of the amount of hydrogen ions ( $\text{H}^+$ ) in a solution.
- ▶ The regulation of pH depending on the necessities of each organ or tissue is extremely important for an organism, since enzymes only act within certain pH ranges and many proteins are only active within certain pH ranges.
- ▶ Neutral pH is one of the properties of water.
- ▶ Many mineral salts are cofactors of enzymes, which means that they are substances without which enzymes do not work.
- ▶ Calcium, Iron, Magnesium, Phosphate, Iodine and Chlorine
- ▶ Calcium is present in almost all cells and has several functions.
- ▶ Calcium plays an important role in muscular contraction, in the blood coagulation process, in the structure of bone tissue, in teeth, in the motility of the sperm cell flagellum and in the transmission of nerve impulses.
- ▶ Hemoglobin is the protein present in blood responsible for the transport of oxygen from the lungs to tissues and cells.
- ▶ The hemoglobin molecule is composed of four protein chains, each with a heme group containing an iron atom. The iron is responsible for the binding of oxygen in the lungs and also for the red color of hemoglobin and therefore blood.



- ▶ Magnesium is fundamentally important for plants because it is part of the chlorophyll molecule (and chlorophyll is essential for photosynthesis).
- ▶ Magnesium also acts as the cofactor of several enzymes plays an important role in muscle relaxation and in the transmission of nerve impulses.
- ▶ Phosphorylation is the name given to processes of the addition of phosphates to some molecules, thus making these molecules more energized. Phosphorylation has an important role, for example, in photosynthesis (the photophosphorylation of the light phase) and in aerobic respiration (oxidative phosphorylation of the respiratory chain). In general, the phosphate used in phosphorylation comes from ATP molecules.
- ▶ Iodine is a chemical element necessary for the proper functioning of the thyroid because it is contained by the hormones produced by this gland. Iodine deficiency creates a type of hypothyroidism known as endemic goiter.
- ▶ Plants, some bacteria, and some algae are capable of photosynthesis
- ▶ In plants, photosynthesis occurs mainly in the leaves
- ▶ Plants use carbon dioxide, water, and sunlight to produce oxygen, water, and carbon dioxide
- ▶ Light reactions in photosynthesis mostly occur in grana. These are dense layered stacks of thylakoid sacs found in plant chloroplasts.
- ▶ In the Calvin Cycle, carbon dioxide is converted to sugar
- ▶ The chemical equation for photosynthesis is  $6\text{CO}_2 + 12\text{H}_2\text{O} + \text{light} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 + 6\text{H}_2\text{O}$ . Carbon dioxide, water, and sunlight are used to produce glucose, oxygen, and water.
- ▶ Photosynthetic organisms include higher plants, some bacteria, and some algae. Photosynthetic organisms are also known as photoautotrophs because they can make their own food from sunlight.
- ▶ Ribosomes translate mRNA into proteins.
- ▶ Mitochondria (eukaryotes) have their own
- ▶ DNA and are a result of early inclusion of a-proteobacteria into a eukaryotic cell.
- ▶ Chloroplasts (plants, protists) have their own DNA as a result of early inclusion of cyanobacteria into a eukaryotic cell.
- ▶ Plasmids (bacteria) are short pieces of circular DNA in multiple copies; nonessential; get transferred between bacteria.
- ▶ All the genetic material of an organism is called Genome
- ▶ The genome consists of genes and non-coding regions.
- ▶ Genes consist of regulatory regions, intron, exons, untranslated regions
- ▶ RNA polymerase, binds to the complex.
- ▶ Working together, they open the DNA double helix.
- ▶ The human body has 12 systems. They are: the cardiovascular system, the digestive system, the endocrine system, the immune system, the integumentary system, the lymphatic system, the muscular system, the nervous system, the reproductive system, the respiratory system, the skeletal system, and the urinary system.
- ▶ The cardiovascular (or circulatory) system transports blood, oxygen, and nutrients throughout the body.
- ▶ The digestive system takes in and processes food.
- ▶ The endocrine system produces



hormones that regulate metabolism, growth and development, tissue function, sexual reproduction, sleep, and mood.

- ▶ The immune system fights infection.
- ▶ The integumentary system protects the body from outside damage.
- ▶ The lymphatic system connects the lymph nodes in our bodies and helps the circulatory and immune systems.
- ▶ The muscular system allows us to move. The nervous system transmits signals through the body and controls voluntary and involuntary actions.
- ▶ The reproductive system allows us to have sex and children.
- ▶ The respiratory system enables us to take in oxygen and expel carbon dioxide as we breathe.
- ▶ The skeletal system gives our bodies a framework and supports the systems. The urinary system expels waste.
- ▶ Your lettered blood type is determined by which antibodies are in your plasma and which antigens are found on your red blood cells.
- ▶ Antibodies are blood proteins, while antigens are substances that activate an immune response and control what enters and exits a cell.
- ▶ Each blood group can be either positive or negative, resulting in eight possible blood types. The +/- part of a person's blood type is determined by the presence (or absence) of a third antigen called the Rh factor.
- ▶ Our bodies can handle blood without the presence of an antigen that we usually have, but cannot handle the introduction of a new antigen into the circulatory system.
- ▶ People with O- blood are known as universal donors; anyone can use O- blood.
- ▶ People with AB+ blood, on the other hand, are universal recipients; they

have every antigen in their blood already.

- ▶ Our DNA is stored in 23 pairs of chromosomes within the nucleus of every cell in our body.
- ▶ Each cell has a full set of chromosomes which contain all the genetic material needed to determine the makeup of our entire bodies.
- ▶ Cloning of animals can be done with just one cell. All the genetic material that defines us is inside each and every cell of our body, from our hair follicles to toenails.
- ▶ Our immune system fights off infection mostly through the use of antibodies and microphages.
- ▶ Antibodies actually fight infection by killing the virus or foreign bacteria, while microphages are white blood cells that surround and contain the foreign cells (or other objects) to prevent the spread of disease.
- ▶ There are ten times more bacteria cells in our bodies than our own human cells. These bacteria are harmless or even help us perform key bodily functions, such as digestion.
- ▶ DNA includes the genes from at least eight retroviruses that were absorbed into our own genetic code at some point.
- ▶ The viral genes in our DNA now perform important functions, especially related to reproduction.
- ▶ Human have more than five senses (and each has its own sensory organ or specialized receptors).
- ▶ Nearsightedness and farsightedness are caused by defects in the shape of our eyeballs.
- ▶ Nearsightedness, or myopia, is caused by a greater curve in the cornea of the eye or by an elongation of the eyeball.
- ▶ Farsightedness, or hyperopia, is caused by a corneal curve that is too small or by a having a short eyeball.



- Some evidence indicates that nearsightedness is genetic.
- ▶ Vaccines safely help the body to recognize and fight off infections later in life.
- ▶ By injecting the body with dead virus cells, we activate an immune system response to the virus without actually catching the disease.
- ▶ Many scientists today think that yawning is a way to keep our brains alert in times of stress, but exactly why that happens or what the yawn does to help our body isn't 100% clear.
- ▶ Many people assume that blood is red simply because of all the iron in it, much like the reason rust is red.
- ▶ The brain works harder while we are asleep than during the day when we are awake.
- ▶ A moderate sunburn can do long-term damage to the blood vessels in your skin, making it more difficult for the affected skin to heal and stay healthy.
- ▶ Every organism is composed of one of two radically different types of cells: – prokaryotic cells –eukaryotic cells which have DNA inside a nucleus.
- ▶ Prokaryotes and Eukaryotes are descended from primitive cells and the results of 3.5 billion years of evolution.
- ▶ According to the most recent evidence, there are three main branches to the tree of life
- ▶ Prokaryotes include Archaea ("ancient ones") and bacteria
- ▶ Eukaryotes are kingdom Eukarya and includes plants, animals, fungi and certain algae
- ▶ Chemical energy is stored in ATP
- ▶ Genetic information is encoded by DNA
- ▶ Information is transcribed into RNA
- ▶ DNAs (Deoxyribonucleic acid) Holds information on how cell works
- ▶ RNAs (Ribonucleic acid) acts to transfer short pieces of information to different parts of cell
- ▶ RNAs provides templates to synthesize into protein
- ▶ Proteins form enzymes that send signals to other cells and regulate gene activity
- ▶ Proteins form body's major components
- ▶ DNA has a double helix structure which is composed of sugar molecule, phosphate group and a base (A,C,G,T)
- ▶ In eukaryotes, DNA is packed into linear chromosomes
- ▶ In prokaryotes, DNA is usually contained in a single, circular chromosome
- ▶ Somatic cells (cells in all, except the germline, tissues) in humans have 2 pairs of 22 chromosomes + XX (female) or XY (male) = total of 46 chromosomes
- ▶ Germline cells have 22 chromosomes + either X or Y = total of 23 chromosomes
- ▶ RNA is similar to DNA chemically. It is usually only a single strand.
- ▶ Several types of RNA exist for different functions in the cell.
- ▶ Proteins are polypeptides (strings of amino acid residues)
- ▶ DNA alphabet contains four letters but must specify protein, or polypeptide sequence of 20 letters.
- ▶ Trinucleotides (triplets) allow  $4^3 = 64$  possible trinucleotides
- ▶ Triplets are also called codons
- ▶ Proteins work together with other proteins or nucleic acids as "molecular machines"
- ▶ "A gene is a union of genomic sequences encoding a coherent set of potentially overlapping functional



products"

- ▶ A DNA segment whose information is expressed either as an RNA molecule or protein
- ▶ A gene can have different variants
- ▶ The variants of the same gene are called alleles
- ▶ Prokaryotes are typically haploid: they have a single (circular) chromosome
- ▶ DNA is usually inherited vertically (parent to daughter)
- ▶ Living things include both the visible world of animals, plants, and fungi as well as the invisible world of bacteria and viruses.
- ▶ All living organisms are composed of cells.
- ▶ The cell is the basic unit of life.
- ▶ Gene Theory: traits are inherited through gene transmission.
- ▶ Genes are located on chromosomes and consist of DNA.
- ▶ Evolution is any genetic change in a population that is inherited over several generations.
- ▶ Homeostasis is ability to maintain a constant internal environment in response to environmental changes.
- ▶ Energy is constant and energy transformation is not completely efficient is called Thermodynamics.
- ▶ zoology deals with animal studies
- ▶ botany deals with plant studies
- ▶ microbiology is the study of microorganisms.
- ▶ Auto - means self, troph - means nourish. Autotrophs are organisms capable of self nourishment.
- ▶ Cyto - means cell, kinesis - means movement. Cytokinesis refers to the movement of the cytoplasm that produces distinct daughter cells during cell division.
- ▶ Eu - means true, karyo - means nucleus. A eukaryote is an organism whose cells contain a "true" membrane bound nucleus.
- ▶ Hetero - means different, zyg - means yolk or union, ous - means characterized by or full of. Heterozygous refers to a union characterized by the joining of two different alleles for a given trait.
- ▶ Hydro - refers to water, philic - means love. Hydrophilic means water-loving.
- ▶ Oligo - means few or little, saccharide - means sugar. An oligosaccharide is a carbohydrate that contains a small number of component sugars.
- ▶ Osteo - means bone, blast - means bud or germ (early form of an organism). An osteoblast is a cell from which bone is derived.
- ▶ Teg - means cover, ment - refers to mind or brain. The tegmentum is the bundle of fibers that cover the brain.
- ▶ (Arth-) refers to joints and (-itis) means inflammation. Arthritis is the inflammation of a joint(s).
- ▶ (Bacterio-) refers to bacteria and (-stasis) means a slowing or stoppage of motion or activity. Bacteriostasis is the slowing down of bacterial growth.
- ▶ (Dactyl-) refers to a digit such as a finger or toe and (-gram) refers to a written record. A dactylogram is another name for a fingerprint.
- ▶ (Epi-) means upper or outermost and (-cardium) refers to the heart. Epicardium is the outer layer of the heart wall. It is also known as visceral pericardium as it forms the inner layer of the pericardium.
- ▶ (Erythro-) means red and (-cyte) means cell. Erythrocytes are red blood cells.
- ▶ Dissecting, we have (electro-), pertaining to electricity, (encephal-) meaning brain, and (-gram) meaning record.



- ▶ An electric brain record is also called EEG. Thus, we have a record of brain wave activity using electrical contacts.
- ▶ (Hem-) refers to blood, (angio-) means vessel, and (-oma) refers to an abnormal growth, cyst, or tumor. Hemangioma is a type of cancer consisting primarily of newly formed blood vessels.
- ▶ Individuals with Schizophrenia disorder suffer from delusions and hallucinations. (Schis-) means split and (phren-) means mind.
- ▶ Thermoacidophiles are Archaeans that live in extremely hot and acidic environments. (Therm-) means heat, next you have (-acid), and finally (phil-) means love. Together we have heat and acid lovers.
- ▶ Biological evolution is defined as any genetic change in a population that is inherited over several generations.
- ▶ Biological evolution is not defined as simply change over time. Many organisms experience changes over time, such as weight loss or gain.
- ▶ Evolution is a scientific theory that was proposed by Charles Darwin.
- ▶ Natural selection is the process by which biological evolutionary changes take place.
- ▶ Natural selection acts on populations and not individuals.
- ▶ Individuals in a population have different traits which can be inherited.
- ▶ The individuals in a population that are best suited to their environment will leave more offspring, resulting in a change in the genetic makeup of a population.
- ▶ The genetic variations that arise in a population happen by chance, but the process of natural selection does not.
- ▶ Natural selection is the result of the interactions between genetic variations in a population and the environment.
- ▶ The environment determines which variations are more favorable. Individuals that possess traits that are better suited to their environment will survive to produce more offspring than other individuals.
- ▶ More favorable traits are thereby passed on to the population as a whole.
- ▶ Genetic variation occurs mainly through DNA mutation, gene flow (movement of genes from one population to another) and sexual reproduction.
- ▶ Sexual reproduction allows for genetic variations to occur through genetic recombination.
- ▶ Recombination occurs during meiosis and provides a way for producing new combinations of alleles on a single chromosome.
- ▶ Independent assortment during meiosis allows for an indefinite number of combinations of genes.
- ▶ Sexual reproduction makes it possible to assemble favorable gene combinations in a population or to remove unfavorable gene combinations from a population.
- ▶ Populations with more favorable genetic combinations will survive in their environment and reproduce more offspring than those with less favorable genetic combinations.
- ▶ The theory of evolution has caused controversy from the time of its introduction until today.
- ▶ The controversy stems from the perception that biological evolution is at odds with religion concerning the need for a divine creator.
- ▶ Evolutionists contend that evolution does not address the issue of whether or not God exists, but attempts to explain how natural processes work.
- ▶ Evolution suggests that all life is connected and can be traced back to one common ancestor.



- ▶ A literal interpretation of biblical creation suggests that life was created by an all powerful, supernatural being (God).
- ▶ Still others have tried to merge these two concepts by contending that evolution does not exclude the possibility of the existence of God, but merely explains the process by which God created life.
- ▶ In paring down the issue, a major bone of contention between the two views is the concept of macroevolution.
- ▶ The biosphere includes all of the Earth's biomes and all living organisms within. This includes areas on the Earth's surface, below the Earth's surface, and in the atmosphere.
- ▶ Biomes encompass all of the Earth's ecosystems.
- ▶ Biomes can be divided into regions of similar climate, plant life, and animal life.
- ▶ Biomes consist of both land biomes and aquatic biomes.
- ▶ The organisms in each biome have acquired special adaptations for living in their specific environment.
- ▶ An organ is an independent part of the body of an organism that carries out specific functions.
- ▶ Organs include the heart, lungs, kidneys, skin, and ears.
- ▶ Organs are composed of different types of tissue arranged together to perform specific tasks.
- ▶ Tissues are groups of cells with both a shared structure and function.
- ▶ Animal tissue can be grouped into four subunits: epithelial tissue, connective tissues, muscle tissue, and nervous. Tissues are grouped together to form organs.
- ▶ Cells are the simplest form of living units.
- ▶ Processes that occur within the body are carried out on a cellular level.
- ▶ There are a number of different types of cells within the body including blood cells, fat cells, and stem cells.
- ▶ Cells of different categories of organisms include plant cells, animal cells, and bacterial cells.
- ▶ Cells contain tiny structures called organelles, which are responsible for everything from housing the cell's DNA to producing energy.
- ▶ Unlike organelles in prokaryotic cells, organelles in eukaryotic cells are often enclosed by a membrane.
- ▶ Molecules are composed of atoms and are the smallest units of a compound.
- ▶ Molecules can be arranged into large molecular structures such as chromosomes, proteins, and lipids.
- ▶ Typical plant cells are eukaryotic (they have a nucleus), autotrophic (they produce their own food) and photosynthetic (they use light to make food).
- ▶ Plant cells also have chloroplasts and a cell wall (a structure exterior to the plasma membrane) made of cellulose.
- ▶ While plant cells are eukaryotic, autotrophic, photosynthetic and have chloroplasts and a cell wall, animal cells are eukaryotic, heterotrophic and do not have chloroplasts nor a cell wall.
- ▶ Plants have specialized organs (such as reproductive organs, roots, branches, leaves) and differentiated tissues (vascular tissue in tracheophytes, support tissue, parenchyma, etc.)
- ▶ The kingdom Plantae is divided into two large subkingdoms: bryophytes and tracheophytes (pteridophytes, gymnosperms and angiosperms).
- ▶ Bryophytes are nonvascular plants (mosses, liverworts, hornworts), meaning that they do not have a conducting system for the transport of



sugar, water and nutrients.

- ▶ Tracheophyte plants are vascular plants, meaning that they have conducting structures.
- ▶ In botany, the plant kingdom is divided into bryophytes, pteridophytes, gymnosperms and angiosperms.
- ▶ Cryptogamic (hidden sex organs) plants do not present flowers or seeds. They include the bryophytes and pteridophytes.
- ▶ Phanerogamic plants have seeds. They include the gymnosperms and angiosperms.
- ▶ Angiosperms are divided into monocotyledonous and dicotyledonous angiosperms. (These categories are explained later in the angiosperms section.)
- ▶ Sexual reproduction may take place through three different types of life cycles: the haplontic haplobiontic cycle (the organism is haploid, a single type of organism); the diplontic haplobiontic cycle (the organism is diploid, a single type of organism); and the diplobiontic cycle (two types of organisms, one haploid and the other diploid).
- ▶ The diplobiontic cycle is known as the alternation of generations, or metagenesis. In humans, the cycle is diplontic haplobiontic (a single diploid organism).
- ▶ Zygotic meiosis occurs in the haplontic haplobiontic life cycle.
- ▶ Gametes from adult haploid individuals unite to form the diploid zygote. The zygote undergoes meiosis and generates four haploid cells that develop into adult individuals by mitosis.
- ▶ In zygotic meiosis, the cell that undergoes meiosis is the zygote and the gametes are formed by mitosis.
- ▶ Gametic meiosis is when meiosis produces gametes, or rather, haploid cells which can each unite with another gamete to form the zygote.
- ▶ Sporoc meiosis happens in metagenesis (the alternation of generations, or diplobiontic life cycle). In this life cycle, cells from the diploid individual (called a sporophyte) undergo meiosis, producing haploid spores that do not unite with others but instead develop by mitosis into haploid individuals (called gametophytes). In this life cycle, the gametes are produced via mitosis from cells of the gametophyte.
- ▶ In the plant life cycle (diplobiontic life cycle) and in the haplontic haplobiontic life cycle, gametes are made via mitosis and not via meiosis. Obviously, in some stage of these sexual life cycles, meiosis must occur.
- ▶ The plant life cycle is known as the alternation of generations because, in this cycle, there are two different forms of living organisms that alternate with each other, one of which is haploid and the other of which is diploid.
- ▶ The alternation of generations is also called the diplobiontic cycle or metagenesis, and it does not just occur in plants. Other living organisms, such as cnidarians, go through this cycle.
- ▶ In the haplontic haplobiontic life cycle, the single and lasting form is haploid. In the diplontic haplobiontic life cycle, it is diploid. In the diplobiontic life cycle, the lasting individual, which alternates with the intermediate form, may be the haploid gametophyte (as in bryophytes) or the diploid sporophyte (as in pteridophytes).
- ▶ There are asexual forms of reproduction in plants. Naturally detached pieces of roots, limbs or leaves may develop into another adult specimen.
- ▶ The artificial asexual reproduction of plants can be carried out by means of grafting or cutting.
- ▶ Bryophytes are nonvascular plants, meaning that they do not have conducting tissues and carry out the



transport of water and nutrients via diffusion.

- ▶ Bryophytes are cryptogamic, or rather, they do not present flowers or seeds; they are small in size; they present water-dependent fertilization; in their life cycle, the lasting form is haploid (the gametophyte) and the sporophyte depends on the gametophyte to survive.
- ▶ The main groups of bryophytes are mosses, liverworts and hornworts.
- ▶ In bryophytes, there are no water-conducting or nutrient-conducting structures and the transport of these substances is carried out via cell to cell diffusion.
- ▶ The small size of bryophytes relates to this feature because if there are no conducting vessels, it is not possible for cells to be too far apart from each other (the emergence of conducting tissues in tracheophytes allowed their increase in size).
- ▶ As in all plants, the life cycle of bryophytes is diplobiontic (the alternation of generations). In bryophytes, the lasting form is the haploid one.
- ▶ In general, the bryophyte sporophyte is a long, tiny stem that grows on the top of the gametophyte. The sporophyte depends completely on the gametophyte to obtain nutrients.
- ▶ Like adult amphibians, bryophytes live in the terrestrial environment but depend on water to reproduce. For this reason, the nickname is justified.
- ▶ The better known pteridophytes are ferns and maidenhair, from the filicinae (filicopsida) group, and selaginellas, moss-like plants from the lycopodinae group (lycopsida).
- ▶ Pteridophytes are cryptogamic plants, meaning that they are flowerless and seedless.
- ▶ Pteridophytes are tracheophyte (vascular) plants, meaning that they

have tissues specialized in the conduction of water and nutrients.

- ▶ Bryophytes are nonvascular plants.
- ▶ In pteridophytes, the substance transport is carried out through vessels whereas, in bryophytes, that transport occurs via diffusion.
- ▶ Bryophytes and pteridophytes have gametes that depend on water for fertilization, the emergence of conducting vessels in this last group facilitated life in a terrestrial environment.
- ▶ The conducting vessels of pteridophytes collect water from moist soil and distribute it to the cells.
- ▶ Bryophytes do not have this option and depend entirely on the water that reaches the aerial part of the plant and, as a result, they need to live in humid or rainy places.
- ▶ Before the evolutionary development of phanerogamic plants (plants that have seeds), pteridophytes predominated in the terrestrial environment.
- ▶ The large pteridophyte forests of the Carboniferous period (named after the pteridophytes) are responsible for the formation of coal deposits, mainly in Europe, Asia and North America.
- ▶ The Carboniferous period occurred between 290 and 360 million years ago and was part of the Paleozoic Era.
- ▶ As the first tracheophytes, pteridophytes were also the first plants to extensively colonize the terrestrial environment, forming forests.
- ▶ Pteridophytes also constituted an important food source for terrestrial animals. Because of their conducting vessels, they could be larger, a feature that phanerogamic plants inherited from them.
- ▶ Ferns are composed of small roots that shoot downwards from the rhizome (the stem, often horizontal).



- ▶ Fronds also arise from the rhizome.
- ▶ Like all plants, pteridophytes go through a diplobiontic (alternation of generations, or metagenesis) life cycle.
- ▶ Pteridophytes are more common in humid places because they depend on water for their gametes to fertilize one another. In humid environments, their reproduction is more intense and they proliferate.
- ▶ In these plants, meiosis takes place within structures called sori, small dust-like brown dots that line the underside of fern leaves.
- ▶ Sori contain sporangia where reproductive cells undergo meiosis and where spores are produced.
- ▶ The prothallus is the pteridophyte gametophyte (the haploid individual that forms gametes). The gametophyte develops via mitosis from a spore.
- ▶ In pteridophytes, gametes are produced via mitosis from special cells of the gametophyte.
- ▶ As with all plants, in pteridophytes, meiosis is sporic, meaning that cells of the sporophyte undergo meiosis and generate spores that then develop into the gametophyte via mitosis.
- ▶ The lasting form of pteridophytes is the diploid ( $2n$ ) sporophyte (the fern itself, for example).
- ▶ In bryophytes, the lasting form is the gametophyte ( $n$ ).
- ▶ Most pteridophytes have underground stems parallel to the substrate called rhizomes.
- ▶ Xaxim is a type of pteridophyte with an aerial stem that is generally perpendicular to the soil and from which hundreds of roots arise to absorb water from the environment.
- ▶ Xaxim stems are used to make flower pots and other plant supports for gardening (also popularly known as xaxims).
- ▶ Gymnosperms group of plants can be divided into: conifers (pine, sequoia, cypress), which have flowers known as strobiles (cones); cycads (very ancient gymnosperms, such as cycads used in garden architecture, which also form strobiles); gnetaceae (gnetum); and ginkgos (the only known species is *Ginkgo biloba*).
- ▶ Gymnosperms are not cryptogamic like bryophytes and pteridophytes.
- ▶ Gymnosperms are phanerogamic, meaning that they form flowers and seeds.
- ▶ The evolutionary importance of seeds is related to the ability of plants to colonize distant areas and to protect their embryo.
- ▶ Embryo-containing seeds can be carried by water, wind and animals and germinate in different environments.
- ▶ Seeds protect the plant embryo from external aggressions and also provide germination under more adequate conditions (inside the seed).
- ▶ Gymnosperm plants are the typical vegetation of cold regions such as the taiga or boreal forest, of the northern hemisphere, or the araucaria forests of the southern hemisphere.
- ▶ Like all plants, gymnosperms have a diplobiontic life cycle, that is, the alternation of generations with diploid and haploid stages. The lasting (final) stage is the diploid one.
- ▶ Pollen grains are the male gametophytes of phanerogamic (flowering) plants. Therefore, within pollen grains, the male gametes of these plants are formed via mitosis.
- ▶ In male strobiles (cones), microsporophylls (fertile leaves of the strobile) that contain microsporangia are present.
- ▶ Within a microsporangium, spore mother cells undergo meiosis and generate haploid microspores.



- ▶ The microspore wall develops into winglike projections (to facilitate its aerial propagation) and mitosis occurs, producing two cells, the generative cell and the tube cell. The final structure containing these elements is the pollen grain.
- ▶ The pollen grain is related to the alternation of generations since it is the male gametophyte (the haploid stage of the life cycle).
- ▶ In female strobiles (cones), megasporophylls (fertile leaves of the strobile) that contain megasporangia are present.
- ▶ In a megasporangium, the spore mother cell undergoes meiosis, generating four haploid cells, three of which regress and one of which turns into the functional megaspore.
- ▶ The functional megaspore undergoes mitosis several times to form the female gametophyte that contains the oospheres (female gametes) of the plant.
- ▶ The female gametophyte is located within the megasporangium, which has a small opening, called the micropyle, through which the pollen tube enters.
- ▶ The microsporangia in the male strobile rupture at the right time of year, releasing thousands of pollen grains.
- ▶ Gymnosperm seeds are formed from the differentiation of the megasporangia of the female strobiles (cones).
- ▶ After an oosphere is fertilized, the female gametophyte produces the haploid ( $n$ ) primary endosperm (nutritive tissue that covers the embryo) and the covering of the megasporangium turns into the diploid ( $2n$ ) seed shell.
- ▶ Flowering plants have flowers and seeds (phanerogamic plants). They differ from gymnosperms because their seeds are located within fruits.
- ▶ Angiosperm plants are divided into monocotyledonous (monocots) and dicotyledonous (dicots) plants.
- ▶ The main differences between monocots and dicots are: the number of cotyledons (seed leaves) in seeds, with one in monocots and two in dicots; the pattern of leaf veins, which is parallel in monocots and reticulated in dicots;
- ▶ Grasses, banana trees, sugar cane and orchids are examples of monocots. Sunflowers, oak and water lilies are examples of dicots.
- ▶ The androecium is the set of male reproductive structures of flowers.
- ▶ Androecium consists of the stamens formed of the filament and anther. One flower has one androecium that may have one or several stamens.
- ▶ The gynoecium is the set of female reproductive structures of flowers. It is generally composed of a single pistil that includes the stigma, the style and the ovary.
- ▶ The androecium usually surrounds the central gynoecium.
- ▶ In addition to the androecium and the gynoecium, typical flowers are also made of a peduncle, sepals and petals.
- ▶ The process by which pollen grains (the male gametophytes of phanerogamic plants) reach female gametophytes is called pollination.
- ▶ Characteristics of the flowers of each plant species relate to the type of pollination used by the plant.
- ▶ The anthers of each stamen contain pollen sacs. Within the pollen sacs are microspore mother cells, or microsporocytes.
- ▶ Cells undergo meiosis to form microspores. Each microspore undergoes mitosis to form a pollen grain containing one generative cell and one tube cell. The pollen grain is the male gametophyte.



- ▶ When pollination occurs and the pollen grain makes contact with the stigma (the apex of the pistil), the tube cell elongates its cytoplasm, forming the pollen tube that grows towards the ovary.
- ▶ The generative cell divides to form two sperm nuclei (male gametes), which then migrate through the pollen tube.
- ▶ The pollen tube, which is the mature male gametophyte of angiosperms, has three cellular nuclei: two sperm nuclei and one tube cell nucleus.
- ▶ All those nuclei are part of the male gametophyte of the plant and, therefore, each of them is haploid ( $n$ ).
- ▶ The flower ovary contains megasporangia enclosed by a tegument with a small opening, the micropyle.
- ▶ Within the megasporangium is a megasporocyte, or megaspore mother cell, which undergoes meiosis to form four megaspores, three of which regress and only one of which is functional.
- ▶ The functional megaspore undergoes mitosis (three times) generating eight cells which, as a whole, form the embryonic sac.
- ▶ The embryonic sac is the female gametophyte of angiosperms.
- ▶ The embryonic sac is composed of: three cells that remain next to the micropyle, which are two lateral synergids and the central oosphere (egg); one binucleated cell, the polar nuclei, placed in the central region; and three antipodal cells, which stay in the opposite side to the micropyle.
- ▶ After pollination, one of the sperm nuclei from the pollen tube unites with the oosphere of the embryonic sac to form the diploid ( $2n$ ) zygote.
- ▶ Self-pollination occurs when pollen grains from a flowering plant fall into the pistils of the same plant and therefore gametes from the same

individual unite to form a zygote.

- ▶ Cross-pollination occurs when pollinators carry pollen grains from a plant to other individual plants of the same species and, as a result, gametes of different individuals form the zygote.
- ▶ Dichogamy is the phenomenon of the maturation of female reproductive structures of the plant during a different period than that of the maturation of the male reproductive structures.
- ▶ Dichogamy prevents self-pollination and makes cross-pollination almost obligatory thus assisting in an evolutionary strategy to promote genetic recombination.
- ▶ A typical seed is composed of the embryo, endosperm and shell. Within seeds of angiosperms, there are one or two cotyledons (seed leaves, one in monocots, two in dicots).
- ▶ The endosperm is the tissue within the seed that has the function of nourishing the embryo.
- ▶ In gymnosperms, the endosperm is haploid ( $n$ ); it is called a primary endosperm. In angiosperms, the endosperm is triploid ( $3n$ ); it is called a secondary endosperm.
- ▶ Cotyledons, or seed leaves, are structures formed by the embryo of angiosperms to absorb nutrients from the endosperm and to store and transfer these nutrients to the embryo.
- ▶ Cotyledons are auxiliary embryonic structures.
- ▶ The seeds of monocots have a single cotyledon. The seeds of dicots have two cotyledons.
- ▶ The main function of fruit is the protection and spreading of seeds.
- ▶ Fruits are modified flower ovaries.
- ▶ The fertilization in angiosperms triggers the release of hormones that act on the ovaries. The ovary wall then



develops into a fruit that contains seeds.

- ▶ In some so-called fruits, the actual fruit is not the fleshy part. For example, the fleshy part of the strawberry is not the fruit.
- ▶ The fruits are the small hard dots on the surface of the strawberry. Another example: the fleshy part of the cashew is not the fruit. The fruit is the nut.
- ▶ The edible part of the onion is the stem of the plant and not the fruit.
- ▶ Plants that produce single-seeded fruits, for example, mangos and avocados, often have ovaries with only one egg inside. Fruits with more than one seed are produced from plants whose ovaries contain more than one egg.
- ▶ Inflorescences are aggregated fruits formed from inflorescences, which are aggregated flowers.
- ▶ Grape clusters are examples of inflorescences.
- ▶ Pseudofruits are "fruits" not made in the ovaries and, in general, their true fruits lack development and are found within the flesh, such as in apples and pears.
- ▶ Parthenocarpic fruits are those made without fertilization, by means of hormonal stimuli, such as bananas.
- ▶ Fruits contain seeds and can detach from the plant by falling on the ground. They can also serve as food for animals.
- ▶ With the emergence of fruits, the seeds of angiosperms could be transported across long distances, thus contributing to the propagation of the species.
- ▶ During the evolution of plants, the tendency has been for gametophytes form gametes that are independent from water.
- ▶ In bryophytes and pteridophytes, fertilization is completely dependent on

water. In phanerogamic plants, such a dependency does not exist.

- ▶ In bryophytes, the gametophyte is the lasting stage. In pteridophytes, gymnosperms and angiosperms, it became the temporary stage and its relative size was successively reduced.
- ▶ A third evolutionary trend relates to the interdependency between gametophytes and sporophytes.
- ▶ In bryophytes, the sporophyte is entirely dependent on the gametophyte to survive.
- ▶ Plant tissues are divided into growth (embryonic) tissues, supporting, filling and photosynthetic tissues (ground tissues), conducting (vascular) tissues and covering (dermal) tissues.
- ▶ The growth tissues of the plants are meristems.
- ▶ Meristems are the tissues that produce plant growth, and are the origin of all other tissues.
- ▶ They are formed of undifferentiated cells with an intense cell division rate.
- ▶ Meristems are classified as primary meristems and secondary meristems.
- ▶ Primary meristems are found at the apex of the stem, in the lateral buds of the stem, at the base and the tips of shoots and within the root cap.
- ▶ Primary meristems are responsible for the primary growth (lengthening) of the plant.
- ▶ Secondary meristems make the plant grow in thickness (secondary growth) and are formed by tissues that thicken the stem: cambium and phellogen (cork cambium).
- ▶ Lateral buds are portions of meristematic tissue located at the base of the shoots. Apical buds are portions of meristematic tissue situated at the tip of the stem and shoots.



- xylem attached to phloem that run longitudinally within the stem. In dicots, vascular bundles are organized side-by-side forming concentric rings.
- ▶ In monocots, vascular bundles are scattered and do not form rings.
  - ▶ The rings observed on a trunk cross section of dicot trees are made of conducting tissues: xylem and phloem.
  - ▶ For tree to grow, it is necessary new vessels within the stem to be formed, a task performed by the vascular cambium. The vascular cambium is more active during hot seasons (summer and spring), generating a lighter band made of large-diameter vessels.
  - ▶ During winter and fall, the vascular cambium produces the opposite. As a result, small-diameter vessels and a darker band appears around the previous lighter band.
  - ▶ Two rings are made per year, one of which is lighter and the other of which is darker. By counting these pairs directly, the age of the tree can be estimated.
  - ▶ Leaf veins are made of vascular tissues. They are composed of xylem and phloem, which respectively conduct water and mineral nutrients (xylem) and sugar (phloem).
  - ▶ Covering tissues, or dermal tissues, in plants are the epidermis (which covers the leaves, the young stems and shoots) and the periderm (a tissue that replaces the epidermis in stems, shoots and roots).
  - ▶ The periderm is made of phelloderm, phellogen and suber (cork).
  - ▶ The stem may be covered by epidermis (which contains stomata, cuticle and photosynthetic cells) as is the case in monocots or, alternatively, epidermis may be replaced by periderm (phelloderm, phellogen and cork) as is the case in dicots and gymnosperms.
  - ▶ Leaves are covered by epidermis.
  - ▶ Phellogen, also known as cork cambium, is the meristematic plant tissue responsible for the formation of periderm (the covering of the stem, shoots and roots).
  - ▶ The inner side of the layer of phellogen forms the phelloderm and its outer side forms the cork (suber).
  - ▶ The suber secretes suberin, an impermeable substance that enters the tissue.
  - ▶ Cork, the same material used as the cork of wine bottles, is extracted from the suber of a special oak tree called cork oak.
  - ▶ Root hairs are external elongated projections of the root epidermis. Their role is to increase the absorption of water by the root.
  - ▶ Bark is the mature periderm of the stem, branches and roots. It dies and breaks off when these structures grow, thus rupturing the peridermal suber formed of already dead cells.
  - ▶ The leaf cuticle is a thin waxy layer made of cutin and waxes, which is located on the outer surface of the leaf epidermis. Its function is to control cellular transpiration.
  - ▶ Roots have a central portion filled with a substance called medulla, which is made of vascular tissue (inner xylem and outer phloem).
  - ▶ The medulla is surrounded by the medullary parenchyma and is enclosed by pericycle, a meristem that produces the secondary roots (ramifications).
  - ▶ On the outside of the medulla lies the cortical portion, which is formed of endodermis (which surrounds the pericycle) and cortical parenchyma.
  - ▶ The covering of the roots is epidermis (with root hairs), which is later replaced with suberized (corky) periderm.



- ▶ The root cap is a protective structure located at the tip of a growing root. It protects the meristematic tissue of the root, forming a cap that surrounds its tip. This cover is necessary because during the growth of the root, the meristem would be injured by friction with the soil.
- ▶ Secondary roots are branches of the primary (main) root. Secondary roots emerge from the pericycle, the inner tissue of the root. Shoots originate from the lateral buds of the stem. Therefore, the origin of secondary roots is endogenous and the origin of shoots is exogenous.
- ▶ Swamp and marsh plants generally contain supporting roots that branch off from portions of the stem above the ground, thus helping the plant to establish itself in muddy and sandy soil.
- ▶ Swamp and marsh plants may also contain respiratory roots (pneumatophores), structures that emerge from buried roots to absorb oxygen.
- ▶ Plants need to carry out gas exchange because they use aerobic cellular respiration (like animals). As a result, they need to obtain molecular oxygen and release carbon dioxide.
- ▶ In addition to aerobic cellular respiration, plants also need to obtain carbon dioxide to carry out photosynthesis and to release the molecular oxygen that is the product of this reaction.
- ▶ In the covering of the leaves and of the primary structure of the stem, gas exchange is carried out through the cuticle and pores of the epidermis.
- ▶ In the covering of the secondary structure of the stem of woody plants, gas exchange is carried out through the lenticels of the periderm (small breaches in cork). Gas exchange in plants is carried out via simple diffusion.
- ▶ Transpiration is the loss of water from the plant to the atmosphere into the form of vapor.
- ▶ Transpiration occurs through the cuticle of the epidermis (cuticular transpiration) or through the ostioles of the stomata (stomatal transpiration).
- ▶ The most important of the two is stomatal transpiration, since it is more intense and is physiologically regulated.
- ▶ Stomata (singular, stoma) are small specialized passageways for water and gases present in the epidermis of plants.
- ▶ As the plant needs to lose more or less water and heat, the stomata respectively close or open, preventing or allowing the movement of gases via diffusion.
- ▶ A stoma is made of a central opening, called the ostiole, or slit, surrounded by two guard cells responsible for closing and opening. A substomatal chamber is located under the ostiole.
- ▶ The opening and the closing of stomata depend upon the plant's need to lose water and heat through transpiration (the exit of water vapor means the elimination of heat).
- ▶ When the plant has excessive, water the guard cells become turgid and the ostiole opens.
- ▶ When little water is available, the guard cells become flaccid and the ostiole closes.
- ▶ Water enters and exits stomata via osmosis.
- ▶ Other factors such as light intensity and carbon dioxide concentration in the leaves influence the opening and the closing of stomata.
- ▶ When luminosity is high the photosynthesis rate increases and the stomata open to absorb more carbon dioxide from the environment and release heat; when luminosity is low, stomata tend to close.



- ▶ When the carbon dioxide concentration in the photosynthetic parenchyma is low, stomata open to absorb more of the gas to make photosynthesis possible; when its concentration is high, stomata tend to close.
- ▶ If plants from a moister region are transferred to a drier region, it is likely that their stomata will remain closed for a longer time, because the time during which stomata are open will be reduced to lower the loss of water via transpiration.
- ▶ During the day in dry habitats, guard cells become flaccid and stomata close; as a result, carbon dioxide is unable to move along to participate in diurnal photosynthesis.
- ▶ Some plants from dry regions solve this problem through the method of nocturnal carbon dioxide fixation. At night, when water loss by transpiration is lower, the stomata open, carbon dioxide enters and it is stored within parenchymal tissues.
- ▶ In some plants whose leaves receive too much sunlight, stomata concentrate in the inferior epidermis. As a result, they contain less heat, and less water is lost via stomatal transpiration.
- ▶ In other plants adapted to dry environments, the stomata group in certain regions of the leaf, as over the surface of these areas, the water concentration of the air is higher compared to in the environment and the loss of water via transpiration is thus reduced.
- ▶ Plants do not only lose water in the form of vapor, as is the case in transpiration. Leaves also lose liquid water through a phenomenon known as guttation.
- ▶ Guttation takes place through structures called hydathodes, which are similar to stomata.
- ▶ Guttation mainly occurs when transpiration is difficult due to high air humidity or when the plant is placed in watery soil.
- ▶ When air humidity is high, transpiration decreases. Since transpiration is a simple diffusion process, it depends on the concentration gradient of water between the plant and the environment.
- ▶ If the atmosphere has too much water vapor, the gradient becomes low or even reversed.
- ▶ During the day, the volume of water transpired is higher than the volume absorbed by the roots. At night, the situation reverses and the roots absorb more water than the volume of water transpired.
- ▶ It can be observed that the volume of water transpired and the volume of water absorbed practically equal over the course of a day.
- ▶ In bryophytes, substance transport is carried out by diffusion.
- ▶ Tracheophytes (pteridophytes, gymnosperms and angiosperms) contain specialized conducting vessels: xylem, which carries water and mineral salts, and phloem, which transports organic materials (sugar).
- ▶ Carbon dioxide and oxygen are not transported through xylem or phloem. These gases reach the cells and exit the plant via diffusion through intercellular spaces or between neighboring cells.
- ▶ The cells that constitute xylem ducts are dead cells killed by lignin deposition. Phloem cells are living cells.
- ▶ Lignin is important because it is deposited on the cell wall of xylem cells, providing impermeability and rigidity to xylem vessels.
- ▶ Root pressure is the pressure that forces water from the soil to be absorbed by xylem in the root. It is caused by the osmotic gradient



between the interior of the root and the soil.

- ▶ Capillarity is the phenomenon through which water moves inside extremely thin tubes (capillaries) aided by the attraction force between water molecules and the capillary wall.
- ▶ The phenomenon of capillarity is possible because water is a polar molecule that forms intermolecular hydrogen bonds.
- ▶ There is an electrical attraction (adhesion force) between the capillary wall and the water molecules, which then pull each other (cohesion force), since they are bound. Other liquids may also move inside capillaries via capillarity, and not just water.
- ▶ Capillarity is not particularly relevant for the transport of water in plants. It only contributes to a few centimeters of ascent.
- ▶ Water enters the roots due to the root pressure and a water column is maintained within xylem from the roots to the leaves.
- ▶ The most important factor that makes water go up is transpiration, mainly in the leaves.
- ▶ As the leaves lose water via transpiration, their cells tend to attract more water, creating suction inside xylem.
- ▶ The cohesion property of water that keeps its molecules bound (one pulls the other) by hydrogen bonds helps in the process.
- ▶ Malpighi's girdling, or tree girdling, is the removal of a complete external girdle containing the phloem (which is more external) from a stem, all the while preserving the xylem (which is more internal).
- ▶ When a girdle is removed below the branches like that, the plant dies because organic food (sugar) is unable to move into the region below the girdle and, as a result, the roots

die from the lack of nutrients.

- ▶ When the roots die, the plant does not obtain water or mineral salts and dies as a result.
- ▶ Plant hormones, also called phytohormones, are substances that control embryonic development and growth in adult plants.
- ▶ Auxins (the best known natural auxin is IAA, indoleacetic acid): their function is to promote plant growth, distension and cellular differentiation.
- ▶ Gibberellins: their effect is similar to that of auxins (growth and distension); they stimulate flowering and fruit formation and activate seed germination.
- ▶ Cytokinins: they increase the cellular division rate and, together with auxins, help growth and tissue differentiation and slow the plant aging process.
- ▶ Ethylene (ethene): this is a gas released by plants, which participates in the growth process and has a noteworthy role in ripening fruit and leaf abscission.
- ▶ The coleoptile is the first (one or more) aerial structure of the sprouting plant that emerges from the seed. It encloses the young stem and the first leaves, protecting them.
- ▶ The top of the coleoptile is generally the region where auxins are produced. If this region is removed, plant growth stops, since auxins are necessary to promote growth and tissue differentiation.
- ▶ Indolacetic acid (indolyl-3-acetic acid), or IAA, is the main natural auxin produced by plants. It promotes plant growth and cellular differentiation.
- ▶ Synthetic auxins, such as indolebutyric acid (IBA) and naphthalenic acid (NAA), are substances similar to IAA (a natural auxin) but which are artificially produced.
- ▶ Auxins are produced and found in large amounts in the apical buds of the





stem and shoots as well as in young leaves.

- ▶ Parthenocarpic fruits are those produced without fertilization. Some plants produce parthenocarpic fruits naturally, such as the banana tree, stimulated by their own hormones.
- ▶ Angiosperms that do not naturally produce parthenocarpic fruits may do so if auxins are applied to flowers before fertilization.
- ▶ In some parts of the plant (the stem, roots, lateral buds), there are auxin concentration ranges in which the hormonal action is positive (it stimulates growth).
- ▶ Apical dominance is the phenomenon through which high (over the positive range limit) auxin concentrations due to auxins from the apical bud moving down the stem inhibit the growth of the lateral buds of the plant.
- ▶ The growth of tree branches can be stimulated by preventing apical dominance through the removal of the apical bud.
- ▶ Gibberellins are plant hormones that stimulate plant growth, flowering and fruit formation (also parthenocarpy) and the germination of seeds.
- ▶ There are more than 70 known types of gibberellins.
- ▶ Gibberellins are produced in the apical buds and young leaves.
- ▶ Cytokinins are phytohormones active in the promotion of cellular division.
- ▶ Cytokinins also slow down the aging of tissues and act together with auxins to stimulate plant growth.
- ▶ Cytokinins are produced by the root meristem and are distributed through the xylem.
- ▶ The plant hormone notable for its ability to stimulate and accelerate fruit

ripening is the gas ethylene (ethene). Because it is a gas, ethylene acts not only in the plant that produces it but also in neighboring ones.

- ▶ Some fruit processing industries use ethylene to accelerate the ripening of fruit.
- ▶ Physical and chemical environmental factors, such as intensity and position of light in relation to the plant, gravitational force, temperature, mechanical pressures and the chemical composition of the soil and of the atmosphere, can also influence the growth and development of plants.
- ▶ Tropisms are movements caused by external stimuli.
- ▶ In botany, the plant tropisms studied are: phototropism (tropism in response to light), geotropism (tropism in response to the gravity of earth) and thigmotropism (tropism in response to mechanical stimuli).
- ▶ Whenever one side of a stem, branch or root grows more than the other side the structure curves towards the side that grows less. (This is an important concept for plant tropism problems.)
- ▶ Phototropism is the movement of plant structures in response to light.
- ▶ Phototropism may be positive or negative.
- ▶ Positive phototropism is when the plant movement (or growth) is towards the light source
- ▶ Negative phototropism is when the movement (or growth) is opposite, moving away from the light source.
- ▶ Most plants have opposite phyllotaxis (alternating in sequence, one on one side of the shoot, the following on the opposite side) as a solution to prevent leaves from blocking the sun received by other leaves, thus improving the efficiency of photosynthesis